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ABSTRACT

This guide to proposed microcomputer systems and their applications for training institutions in developing countries discusses the development of such systems and recommends hardware and computer software configurations for typical training applications. Arguing that the microcomputer should be used for greater personal and institutional efficiency, the guide provides specific examples of applications, including visual aids; case studies; teaching and lecture notes produced with desktop publishing and graphics software; video imaging systems; expert systems in training; databases of learning materials; programs, and human resources; electronic links (information networks and local area networks) between training institutions in developing countries; and shared databanks. It is recommended that technical assistance be provided for all those who use the system to enable themselves to keep the system in good working order and to use special functions of the system. The appendix contains detailed specifications for microcomputer equipment required for the production of visual aids and desktop-published manuals; examples of materials developed using desktop publishing; and samples of overhead transparencies as used in typical training situations. (12 references) (DB)

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Human Resource Development

ED340350

USING MICROCOMPUTERS IN TRAINING INSTITUTIONS

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1991

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Guide on proposed microcomputer systems and applications for training institutions in developing countries - discusses development of microcomputer systems - recommends hardware and software configurations for typical training applications and the use of microcomputers for greater personal and institutional efficiency - gives specific examples of applications: visual aids, case-studies, teaching and lecture notes produced with desktop publishing and graphics software; developing video imaging systems; expert systems in training; creating databases of training materials, programs, and human resources; establishing electronic links between training institutions in developing countries; using shared databanks.

English (Free to developing countries)

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Note

Unless otherwise specified, all references to dollars ($) are to United States dollars.

The following abbreviations are used:

ASCII	American Standard Code for Information Interchange
CGA	Colour graphics adapter
DDE	Dynamic data exchange
DOS	Disk operating system
DPI	Dots per inch
DTP	Desktop publishing
EGA	Enhanced graphics adapter
GEM	Graphics environment management (line-art format)
ICBs	Image capture boards
IMG	Image (graphic image format)
ITC	International Trade Centre UNCTAD/GATT
LAN	Local area network
NTSC	National Television Standards Committee
OCR	Optical character recognition
PAL	Phase alternate line
PC	Personal computer
PCX	PC Paintbrush (graphics image format)
PS/2	Personal System 2 (IBM trade mark)
RAM	Random access memory
RGB	Red, green, blue
TIFF	Tagged image file format
VGA	Video graphics array
WYSIWYG	What you see is what you get

Section 1

Microcomputers in training institutions

The microcomputer has today become established as an indispensable analysis and decision-support tool for business. A wide range of hardware and software is used at all levels within companies, with innovative products frequently anticipating the user's needs.

However, not all the capabilities offered by the microcomputer are fully utilized in training. This may be due to several factors:

- Professional trainers, academics, and administrators at training institutions do not always understand the contribution microcomputers can make to management and training;
- Software applications developed within the training institution often fail to meet the needs of the institution, and are rejected by the end-user;
- Lack of time to learn and adapt to new systems;
- Scarcity of locally available equipment and inadequate training in some developing countries;
- Resistance to change and defensive attitude when faced with new systems.

The reasons for such problems must be analysed and the obstacles to change overcome if developing countries' ever expanding training requirements are to be met in a flexible and effective way.

Hardware and software are in fact changing so fast that a non-specialist may find difficulty in understanding and keeping up with the latest developments. This makes it all the harder to choose a computer system. Fortunately, new microcomputer products have become much more "user-friendly" than they were a few years ago. It is no longer necessary to be a professional programmer to be able to design a customized word-processing, spreadsheet, database, or graphics application.

In addition, after some years of separate development, hardware and software are now developed in accordance with recognized international standards. Such standardization has made it easier to switch programs between microcomputer systems. The basic standard, adopted by more than 20 million users world-wide, consists of the following elements:

- An IBM-compatible personal computer (PC), with standard bus (not PS/2);
- The DOS operating system (disk operating system).

This is now so well established that it should be the basis of any investment in microcomputer hardware and software.

It should be noted that leading manufacturers, in response to market demands, now sell a base system incorporating the above elements. These "entry level" systems are often excellent value since strong competition keeps the prices low, to the end-user's benefit. At the other end of the scale, the most recent, powerful, high-speed systems are certainly an incentive for developing better applications, but these expensive machines now have such processing power that they far exceed the requirements of the average single user, and may even exceed the needs of a medium-sized organization, unless it is a real "power user".

As the choice is now so wide, an organization should carry out a comprehensive needs analysis before deciding on any computer system. This guide provides some guidelines to training institutions considering such a decision. Designed from the end-user's point of view, the guide is based on the experience of the International Trade Centre UNCTAD/GATT (ITC) in developing PC units and systems in training institutions the world over.

Section 2

The microcomputer as an aid to productivity

Professional trainers and heads of training institutions often ask certain questions on the use and performance of their current microcomputer. Typical questions received by ITC are:

- How can the existing system increase our working efficiency?
- What kind of software applications should our training institution acquire?
- Where can the staff be trained?
- What service arrangements do we want from local suppliers?

Training institutions should consider microcomputers for the following purposes:

- General management;
- Training applications.

General management is an area where microcomputers can considerably improve organizational and management tasks of a repetitive nature, or which involve long lists and checks, e.g.:

- Compiling lists of: students, trainers, technical experts, collaborating training institutions, examination results, training course contents and publications;
- Preparing course schedules, session sheets, students' reports and presentations;
- Drawing up financial statements and budgets;
- Classifying library contents by subject, author, and document type (e.g. case-studies, reports, etc.).

These applications are not limited to a training context; in reality they are general management tools, similar to those used in the public or private sectors. Nevertheless, some more advanced training institutions in developing countries have developed their own special applications programs: these can be exchanged with applications of other institutions.

Training applications on microcomputers are a more recent development and may be divided into two areas: applications for students, and for trainers.

Applications for students: Growing importance is attached to providing students with special facilities, possibly allowing them access to standard microcomputers in specially equipped classrooms. It would, however, be unwise to develop special applications for students, as the majority of them only need basic word-processing, and possibly spreadsheet, programs. Small, stand-alone microcomputer systems should therefore be the rule, as a low cost per unit is essential. More and more training institutions, particularly in the private sector, have already bought or are considering buying equipment for these purposes, particularly when technical assistance programmes form part of bilateral or multilateral projects. A great deal of prior planning is necessary before the classroom equipment is decided on: low maintenance costs and the flexibility to upgrade later are vital, because intensive use by untrained students will take its toll of the classroom systems.

Applications for trainers: There are now many user-friendly PC-based applications on the market. Macintosh computers are even better in this respect, but they cannot communicate with IBM-compatible systems, and the machines themselves are expensive. Teachers and trainers can now use ever-more powerful dedicated PC-based systems, enabling them to prepare their own courses, write course notes, design visuals, and access external databases, among many other things. It should be fairly clear that, for this type of work, teachers and trainers need more powerful systems than students. They do not need to have all this power at once though, because, provided the initial machinery conforms to industry standards, equipment and software can gradually be improved in line with growing training requirements.

Section 3

The importance of the learning period

The first stage after the acquisition and installation of a microcomputer system is an introduction on how to use it. In-house manpower resources are usually taken up with other duties, and training or introductory modules specifically for trainers and teachers do not exist: they are left to work at the system themselves with the result that, owing to other work commitments, they are unable to develop appropriate applications.

Faced with these limitations, the head of a training institution often has to rely on the services of a specialized computer training organization, or a computer manufacturer or dealer. Such a short-term solution may satisfy immediate requirements, but it can lead to significant uncontrolled expenditure and unhealthy reliance on a single supplier for services and equipment.

Although creating tutorials for individual training may involve greater initial expense, it will certainly pay for itself in the long term. Anyone in the training institution who needs training - provided he or she is given the time to do it - simply accesses the training module, free of charge. In practice, most tutorials and training modules are supplied along with the manuals when the licensed copy of the software is purchased. Of course, there may be no manuals or training module if the software has been acquired illegally, i.e. it has been copied from an unknown source. Illegal software frequently contains bugs or harmful viruses.

These tutorials and manuals are generally of a high quality, comprehensively tested, and sometimes offer a "hot line" for telephone assistance from the software publisher - although only legitimate users can take advantage of it. Tutorials and manuals of this sort are usually supplied with the major word-processing, database and spreadsheet programs. In fact, most of the external training courses organized by independent consulting firms are based on these official teach-yourself programs. Why pay for a training course from an external training organization when it comes free with legally acquired software?

Following on from this, would it not make sense to build a "core" manual and training module for trainers showing how to use a microcomputer, instead of bringing in outside help? Given the many restrictions of fixed training periods for groups, a more flexible approach is to be preferred. During the learning period, if trainers are given free time, a room, and a basic framework for developing their own, limited applications, the learning process will be greatly enhanced. Another advantage of these computer-based tutorials

is that they are easy to put to use: the trainer can readily adapt them to make his or her day-to-day work easier. The trainer could, for example, build a small database of students for general management, examination, or supervisory purposes.

Such training modules - regarded as on-the-job training applications - are more likely to be used efficiently as they have been developed in response to real needs. It must also be borne in mind that the developer is, as it were, the program owner, justly proud of his or her output, with a constant incentive to improve further the application he or she has created.

Section 4

Developing training applications

The following is based on the assumption that the training institution will acquire a microcomputer system (or a workstation) specifically for its trainers. It is not a viable option to have one microcomputer used by many users over a range of applications: for this reason a dedicated system is preferable, with powerful and well-known software so that trainers can transfer data and the applications they have developed.

Once the hardware and software have been installed, trainers should be able to develop applications for use by the rest of the institution as well as themselves. Training materials or databases, for example, can be developed for use as part of the institution's regular courses.

At this stage, it is possible to undertake particular projects. The following five different types of computerized activity - in increasing order of complexity - will serve to illustrate what a microcomputer and associated software can do for a typical training institution. It is recommended that they be introduced one at a time, as part of an overall plan for computerized applications:

- Designing and producing visual aids for use in courses and lectures given by trainers;
- Printing and editing case-studies, research papers, course notices, etc;
- Developing computerized video-imaging systems;
- Using and adapting expert systems that deal with training and advisory applications;
- Developing associated databases on research papers, student projects, course contents, in-house publications, etc. The initial data could be scanned from hard copy - i.e. paper - to avoid retyping, and properly classified in order to build up a computerized reference library. Once created, the databases can be connected either via a local area network (LAN) or to external organizations.

Current projects and future developments

The five schemes listed above have already been tested or are currently being developed by the ITC Training Section and training institutions in selected developing

countries. As part of various technical co-operation projects, they are transferred to training institutions which have set up special data-communications links, and provide an excellent example of recent microcomputer technology in action.

Once training institutions have built up their data banks, and as technology improves, they will soon be able to connect their systems and, possibly, exchange their training materials, research papers and so on, provided that their microcomputers and programs are compatible, and have the facilities to communicate with each other.

Distance teaching through teleconferencing and computerized media: a promising future

Some of the more advanced institutions are applying the latest technology in the development of interactive distance teaching, in which feedback can be obtained from the participants. Video and telecommunications can now link all the scattered elements, including computer-based training materials. The whole training module can be broadcast through satellite video channels as a simultaneous two-way transmission, i.e. information can be sent and received at the same time. This is known as duplex communication. It is probable that multimedia teleconferencing facilities, now available through satellite transmissions, will emerge as a new communications and training system. Even if the whole arrangement seems technically complex, it could, surprisingly, reduce the per capita cost of distance teaching: large savings are to be made by reducing speakers' and participants' travelling costs and the time spent away from their other duties.

Teleconferencing sometimes involves replacing traditional video production media with computerized media. Traditional video training programmes are very expensive to make, with an average cost of between $1,500-$2,000 per minute. As they are also highly structured, they tend to show their age very quickly, particularly in the world of international trade. It is therefore likely that there will soon be a move away from fairly rigid video modules towards more interactive teleconferencing techniques using computerized data, with an increase in the numbers of people producing training modules. The largest computer manufacturers are currently considering unified standards for image and sound processing, in order to replace traditional video techniques with computerized and digitized images and sound. Traditional videotape will be supplanted by interactive databases linked to teleconferencing facilities, making distance teaching a completely two-way process. The next figure illustrates a teleconferencing network: it should be linked to the training institution's local area network (LAN) remote-access system.

Until now, the type of equipment available and broadcasting regulations restricted these developments to pilot schemes. However, given the developing countries' substantial training requirements, and the experience of some of them - India, for example - in multimedia, could the manufacturers not be approached with a view to possible sponsorship? This would help to fund such pilot schemes. The more dynamic training institutions could even become leaders in this emerging field.

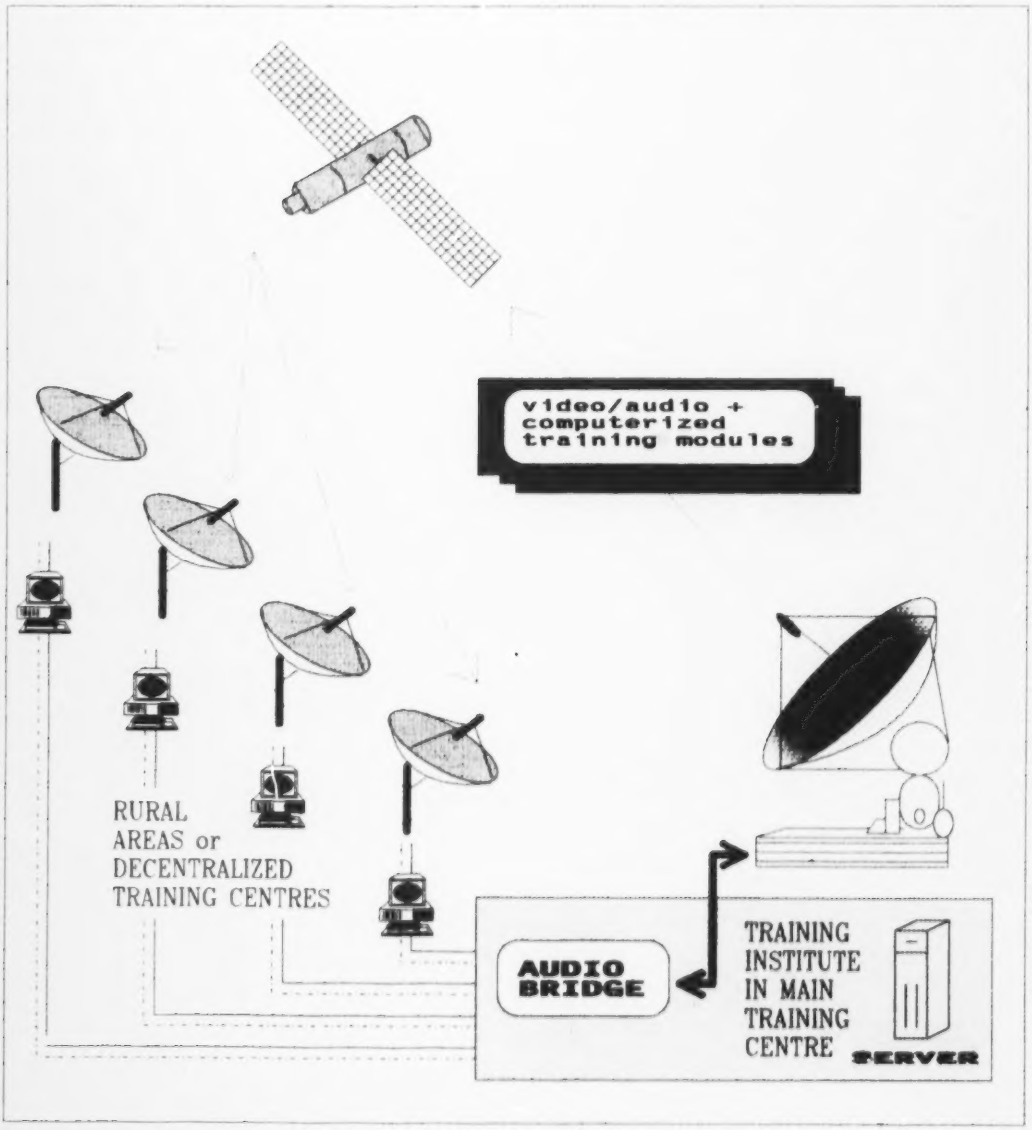
Integrated systems and remote connections: examples

A training institution that is scheduling the computerization of training materials, research papers, and courses, etc., needs to know the approach to adopt, both to avoid duplication of work and equipment, and to create a positive attitude to computers among its staff. Investment in computers in terms of time and money can be heavy: an organized approach must be adopted. The best way is to start with simple projects and activities,

FIGURE 1

EXAMPLE OF A NATIONAL TELETRAINING NETWORK

FULL VIDEO AND COMPUTER-AIDED PROGRAMS ARE BROADCAST TO ALL REMOTE LOCATIONS IN THE NETWORK, WITH FULL DUPLEX INTERACTIVE AUDIO AND DATA COMMUNICATION



and once they are successfully established and well accepted - i.e. the number of staff within the institution producing and using computerized data is growing - a move can be made towards the next stage in the process, with its requirements for additional equipment and in-house training.

The pages that follow present five typical computer applications for trainers and training institutions. They become progressively more complex, starting with the production of overhead transparencies and ending with network installations and data communications with other systems, inside or outside the country. The hardware and software requirements, together with an estimate of the setting-up period, are given with every application. Examples of the applications are given in the appendix. These examples could be taken as the basis for a computer system, amended as required by the training institution, but they would probably be more useful as hints in the creation of original material. Management might find it helpful to invite the faculty members to give their opinion - in teams with responsibility for producing a pilot scheme and for reporting on problems and solutions - and then to make any necessary changes.

The five applications have been tested and applied, or are currently being installed, in selected business schools in developing countries. A LAN need not be installed at the beginning, and in fact most training institutions can expand their microcomputer activities without such systems. It is worth while, though, to look at the whole picture, as this will be helpful for any later changes to the system.

It is hoped that these shared experiences will help training institutions to adapt their curricula to identified needs, and attract more students and skilled teachers. This in turn should increase the institution's prestige among the business community and organizations with which it deals.

APPLICATION 1. DESIGNING VISUAL AIDS

More trainers are now incorporating visual aids into their presentations and are demanding higher quality of these aids. Additionally, the need to update, modify and personalize visuals for export training is rapidly becoming more pronounced, obliging training institutions to obtain the necessary equipment.

Without hardware, software and individual training, it is impossible even to contemplate the production or development of visual aids. The specifications that follow are recommended on the basis of ITC experience throughout the world.

Hardware requirements

An IBM AT-compatible computer with 40 megabyte hard disk; monochrome or EGA/VGA colour screen; and printer capable of printing transparencies with graphics resolution of at least 150 dpi (dots per inch). More technical details and average prices are given in the appendix.

Software requirements

The Windows environment and graphics programs (Draw or In-A-Vision for simpler graphics, and Corel Draw or Designer for more powerful graphics). Non-Windows programs have a major disadvantage: they cannot easily exchange data and graphics between applications and often only accept their own format. The total outlay on these programs, including Windows, should not exceed $2,000, and is less than the cost of a base model microcomputer without a printer. It should be mentioned that although pirated software is easy to obtain, it may contain bugs or viruses. What is more, such illegal copies are not accompanied by manuals or technical support. Although using such copies may seem a cheap option in the short term, the major long-term danger is that hidden viruses can take hold at any time, resulting in the loss of many months' work.

Printer requirements

Details are given in the appendix for selecting a printer, but one thing to remember is that some graphics subprograms - in Designer for instance - may take five or ten minutes to print a page, especially in background mode. A powerful laser printer may cut this down by two-thirds, but they cost a lot more. Printers should not really be shared for graphics printing, as this will further increase printing time. Many drafts of the printed version (on paper or transparency) are often required to get a final, clean copy, thus making the printer unavailable for other uses.

Training requirements for producing training aids

ITC experience suggests that the following training periods are the average for producing in-house training aids:

- Two days for a user who knows the Windows environment; one day for a user who is already familiar with a mouse device.
- One week for a user with very limited knowledge of microcomputer software (limited perhaps to word processing).
- One and a half to two weeks for a beginner.

- Note: a training week is five working days, with two to three two-hour sessions per week.
- If no prior training has been planned, the familiarization period should include time to produce specific visuals, preferably linked to trainers' identified needs.

The investment in time and equipment may, to an individual, appear somewhat large, but seen by the institution, it represents only a small part of total computer expenditure. Besides, once the skills and knowledge are acquired, they may be transferred not only to other applications within the same operating environment, but can also be used to update other documents and programs.

Creating and developing visuals: do's and don'ts

For a trainer with a clear idea of what he or she wants to develop with access to the necessary hardware and software, building a visual aid will take 20-30 minutes - at least half a day for a beginner - while modifying an existing visual will only take a few minutes. Perhaps the advantage of building a database of visuals, stored as a computerized library, is now apparent.

For a user familiar with the Windows environment, using a new program under Windows is a straightforward process: the documents produced can be transferred from one program to another in seconds. Such documents may have been scanned: scanning is the transfer of a typed document into the computer memory without retyping, through the digitization of the picture; once scanned, this picture can be modified by any compatible program.

If the trainer is unsure of what an appropriate visual image is, he or she can refer to visuals already developed for existing publications, including marketing documentation. With a hand scanner ($300), and even without prior training, the scanning process can be learned in a few minutes. Manipulating text and graphics in this way was virtually impossible a few years ago: it can now be mastered after a half day's training. However, the user still needs to be imaginative and should have a clear understanding of what the visuals are intended to portray: scanners and drawing programs are tools, and not substitutes for creativity.

A gradual approach is to be preferred at the beginning: learning by trial and error, producing simple text-only documents, learning about fonts, and so on, then progressively introducing new techniques such as boxes, shadows, arrows and colours. Printing a single page may take a long time, even with a fast computer, because of the way graphics are constructed. Rather than running off printed copies of the picture to check on progress, it is usually quicker to modify the picture on screen until it is just about ready, then select a low resolution for the printer and print a draft copy; only when the whole page layout seems perfect is it time to increase the printer resolution and launch the final print.

In order to illustrate the above points, common examples are given in the appendix. Remember that a visual should remain readable for any participant in a room: big letters, key words, and simple messages are easier to understand and retain than complicated ideas. If a complex message has to be put across, use superimposed transparencies, with each one adding a further element in the message. Finally, the trainer should test his or her overhead transparency before using it in a real training situation, by sitting in a far corner of the training room: even from this position, the transparency should attract the viewer's attention. If any changes are required they should be made now. Remember

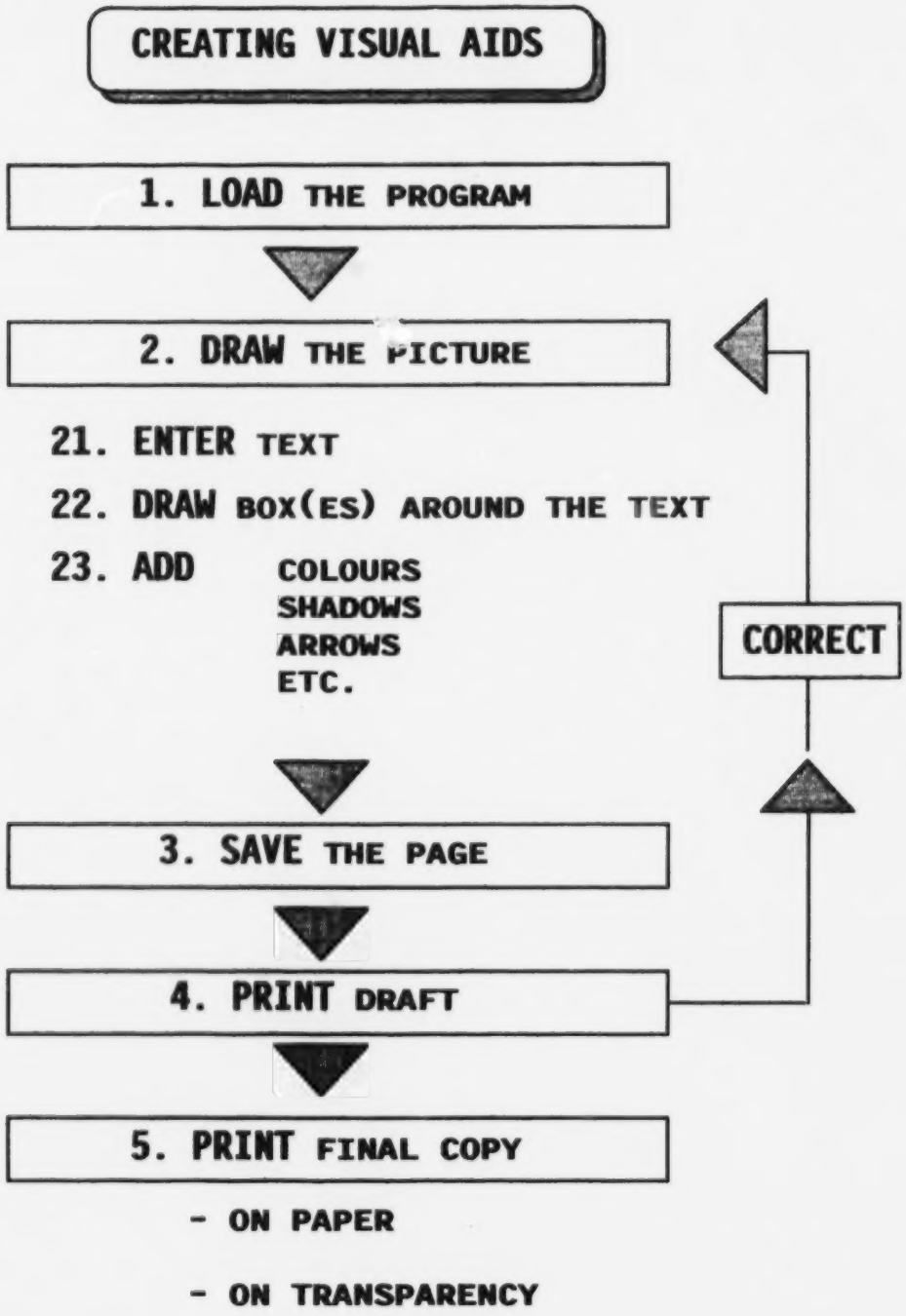
to make a back-up copy of your pictures in an organized way, on a properly labelled diskette, as this is easier to duplicate for colleagues than work in a cluttered subdirectory. This rule should apply to all documents.

Beyond overhead transparencies: slide shows

Some advanced training institutions and leading export companies have stopped using slides - among other reasons because of production and distribution costs, and heavy investment in machinery - and have moved on to slide-show technology, comprising special slide-show software and a personal computer. This is a very cost-effective method of training. With small training sessions, participants are grouped around the personal computer monitor. When there are more students, a projection device - costing about $2,000, much cheaper than in the past - is used. It is the same size as a book, and is placed on the overhead projector for reproducing the computer-generated colours on screen. The slide show is in fact a special software program, which organizes a list of picture-files stored on disk. To present a slide show, the course leader types the name of one or more files in which the pictures are stored, and indicates the slide sequence, timing, and the fade or dissolve process between pictures. The whole process can be completely automated, or controlled by the touch of a forward/backward key. Among the well-known slide-show packages are VCN Concorde, Show Partner, and PC Storyboard. The package should also be able to accept pictures generated by other software programs in, for example, PCX standard format, and should also include clip art libraries. Clip art is a set of pre-stored symbols, ready for electronic cutting and pasting onto any chart, giving the appearance that the art department has been involved. In addition, questions to students may be included, and the system may be programmed to display certain pictures for given replies. For more details, refer to the ITC guide *Choix et développement d'un système micro informatique*. It has probably become apparent by now that a slide show cannot be seriously contemplated without the existence of a well-stocked library of overhead slides: a slide program should consist of at least 20 pictures, each displayed for 30 seconds to two minutes. Shorter display periods make discussion difficult, and participants may feel that they are being entertained rather than trained; longer display periods, unless required by unusual subject matter, may be boring and will lose the students' attention. Some experience at least is essential when putting on a slide show: it is a good idea to test the program among small teams of teachers first, then with limited and well-defined target groups.

A major advantage of slide shows is that they can use existing data or graphics libraries, can be stored separately and can be transmitted on diskette or via modem. They can then be copied, and sent to other institutions as independent training programmes or modules. The training institution should provide an incentive to authors for writing slide shows, at least by crediting them correctly.

FIGURE 2



Note: The layout for this page has been prepared to resemble a transparency, giving easy reading on screen using an overhead projector.

APPLICATION 2. PRODUCING CASE-STUDIES AND TEACHING NOTES WITH DESKTOP PUBLISHING (DTP) PROGRAMS

The trainer may wish to create or amend case-studies, teaching notes and materials, besides producing visual aids. Before the advent of the microcomputer, it was extremely expensive to publish and print such documentation, which may explain the scarcity of locally produced material, particularly material used in trade promotion. Until recently, teaching notes and documents were typed, photocopied - often poorly - and distributed in small numbers. If foreign-language versions were required, it was very rare that budgets could be stretched to meet the translating, typing and publishing costs.

Today, training material can be produced quite easily and professionally with good DTP software: text and graphics can be combined, the print quality is better, and costs are a lot lower. Translation costs can also be minimized, since text revision can be self-checked with on-line dictionaries.

Hardware requirements

An IBM AT-compatible computer, at least a fast 286 or 386 SX; a full 386 would be better as memory requirements, particularly with graphics, are high. A RAM of 4 megabytes is recommended. A monochrome or VGA colour screen is the starting point; if a complete DTP workstation is contemplated, a large screen (19 inches) is required, but this costs much more. A hard disk of at least 60-80 megabytes is required.

For DTP applications, the key component is the printer. A high quality printer is essential, as the only visible output comes from the printer. A standard (and noisy) dot matrix printer will not produce top quality graphics. Laser printers are the best suited for DTP purposes. As ink-jet printers cost only half as much as laser printers, they may be an alternative: they offer approximately the same resolution as laser printers, but are slower. Colour laser printers are very expensive; ink-jet colour printers such as the Hewlett-Packard Paintjet - about $1,000 - may offer an alternative, but printer resolution is only 150 dpi, compared with standard laser printer resolution of 300 dpi. Whatever printer is used, though, must be fully compatible with the software. A full range of fonts must also be readily available, either via the hardware or the software. Laser printers offer the more powerful alternative, and are particularly useful for full-page, multifont printing involving page description languages such as Postscript, or for special techniques. These additional options are available at a cost. Speed is also a consideration when there are a large number of pages to print, while the ability to upgrade is important when print-shop quality is required.

While not essential at the outset, a scanner is a key component for DTP applications. With its low price - $300 - a hand scanner can be considered at a fairly early stage.

Networking is not essential for DTP applications. It might be better to say that it is not even recommended, since DTP files are large and the programs memory-intensive. Frequently, compatibility problems arise in resident mode when the network management program is competing with the DTP program for available memory. Any multitasking operations will, in any event, drastically slow the system down to unacceptable levels.

The normal cost of a typical complete workstation for DTP (without networking) should not exceed $8,000. Add $2,000 if a large screen is to be installed, and another

$2,000 for Postscript. (The high price of Postscript printers, currently selling for $5,000-8,000, is due mainly to royalties paid by the printer manufacturers to Adobe, the developers of Postscript.)

Scanners

For intensive text-oriented applications, as well as for graphics and image-oriented programs, the scanner is often indispensable. Many traditional PC users have not used a scanner, and so it would be useful at this stage to introduce it and show how it can be used.

The microcomputer regards the scanner as an input device, similar to a keyboard. The scanner transforms a page containing typed characters and images into a digitized graphic which immediately appears on the screen. It is made up of hundreds of tiny dots, and, as a graphic, is easy to tidy up or modify. It can then be transferred into a graphics program for alterations, reshaping or colouring, etc. The picture can then be printed, saved as a file, or easily exported into a DTP program.

Confusion sometimes arises over how a scanner works: a scanner is a digitizing device, and as such it does not recognize typed characters as individual characters, but converts them into black and white micro-points. In order for a word processor to use a scanned image directly, an optical character recognition (OCR) program must be used. OCR software often comes as an option with the best scanners, and is compatible with the major word-processing programs such as Word, Wordperfect, Wordstar and Display Write - yet another reason for using well-known word processors. The OCR software scans the typed page directly into the word-processing program, allowing the document to be word processed or faxed immediately as a text document. A scanner therefore avoids the tedious task of retyping a document, which can often add mistakes of an all-too-human kind. The scanned text may, however, have some unknown characters requiring correction, but all this needs is a quick pass in a spelling checker. Inputting text without retyping is clearly something of a revolution for secretaries and writers of training materials, which is why much research and development expenditure is being devoted to improving OCR software and scanner hardware. A scanner should dramatically raise productivity in the typing pool. For training institutions, scanning lists of students, etc., should save a lot of time at the cost of few mistakes, and be much easier to check. Equally, when new documents are produced on typewriters, scanning avoids the need for retyping into a word processor. The final, typed document can be captured by the scanner as a text file, saved to diskette, and printed by just about any computer system. This method can obviously be used by students or trainers whose research was originally typed on a typewriter, but who would now like to have it on microcomputer. Used in this way, scanning goes far beyond simply backing up specific texts: it can be used to help build a complete data bank of important documents. This will be discussed further in application no. 3.

DTP software requirements

It is most important to work within a graphical environment for DTP, as this ensures greater flexibility than a non-graphical environment: Microsoft Windows is recommended for this purpose. Windows allows data, graphics and text to be easily incorporated in the same file, and can even run telecommunications sessions in the background. It should not cost more than $200. The latest version, Windows 3, is a very powerful and user-friendly environment, and rivals the Macintosh in this field, offering graphics, colours, and dynamic data exchange (DDE) among a host of programs which

will revolutionize the old DOS-based approach to the PC. If a beginner has already seen Windows 3 in action, he or she will not be impressed on going back to DOS and seeing a virtually blank screen when the machine is turned on. Most actions in Windows are performed with a mouse, so that the keyboard is only really used for data entry.

Two of the best-selling DTP programs are available for Windows and DOS: PageMaker from Aldus, and Ventura from Xerox. Professional publishers regard Ventura as the more powerful (and complex) DTP program ideal for sizeable technical books, and PageMaker for shorter publications such as leaflets, newspapers, and booklets, etc. Both programs are similar in the number of DTP functions they offer, but PageMaker is the easier to master. The fact that PageMaker works within the Windows environment makes it more user-friendly, since transferring data, text or graphics between different programs is simply a question of cutting and pasting. As all programs under Windows are linked through DDE, a modification in one of them - perhaps in Excel, a spreadsheet program - will be reflected in any other program using the spreadsheet for primary data, even if this other program is a graphics program. This therefore permits a whole range of possibilities, with WYSIWYG (what you see is what you get) programs and "what if" conditions reflected in the final printed document. This is invaluable in a training scenario, because if a mistake is visualized it can be corrected without having to dig too deeply through the other programs.

Most scanners are compatible with the Windows environment. Some standard formats are accepted by the major DTP programs (PageMaker and Ventura), while others are not recognized or require special treatment before being exported into the DTP software. Unfortunately, documents produced in PageMaker under Windows cannot be transferred to Ventura under GEM, and vice versa. Therefore, before selecting a DTP program, check whether the scanner works with Windows (PageMaker) or GEM (Ventura). Apart from this question of compatibility, all scanned images can be treated within the selected environment as a normal document, or part of a document. This again illustrates that programs and scanners working with Windows are much easier to handle than those working with GEM.

Publish It! is a good alternative for less demanding work such as leaflets and short documents. It may typically be used for home-produced documents and is easy for beginners to master.

One of the best text-processing programs under Windows is Ami Professional from Samna, and is good for formatting in WYSIWYG mode. WYSIWYG means that what you see on screen is what you get printed on paper, but this does not always apply to non-graphical word-processing programs. The best word processing package at the moment is probably Microsoft Word for Windows, but because of its power requirements it really needs a 386 machine to work properly.

For drawing overhead transparencies and visuals, Draw or In-A-Vision are very flexible and easy to learn. For more sophisticated pictures with colours and curved lines and letters, etc., then Designer or Corel Draw are recommended, but these require more training. All these packages can transfer images among themselves, without complex conversion and reformatting operations and of course, all file formats are compatible as they work under Windows. If a Windows database is required, the best solution for the moment is to use Dbfast - it is 100 per cent dBase compatible - or Excel - which has most of the features of a complete database program.

For scanning (without OCR software) PC Paintbrush Plus dominates the market because of its functionality and sells for approximately $200. There may be no reason to buy it, though, as Paintbrush is included with the most recent version of Windows (Windows 3).

Total software expenditure on all the above programs should not exceed $3,000 for English versions. They can be obtained through mail order, and are delivered with thorough and well-written teach-yourself manuals. Local prices should be checked carefully, as technical assistance is rarely offered by local suppliers: even the training they offer may simply involve software installation and some teaching taken from the training module that comes with the software. Local dealers are usually unable to give technical support and are often unauthorized by the publisher to modify any part of the software. Why pay any more? Most DTP software publishers offer technical assistance over the telephone (frequently called the customer service hot line) even to foreigners, provided the English language is used, of course.

Developing DTP materials

Assuming that the basic, possibly hand-written, text exists, a few steps have to be taken to produce a stock of training materials. First, text and graphics can be input by the trainer, by students, or even by secretarial support staff. A word-processing program compatible with the DTP program should be selected; the DTP program is then able to import the word processed files. If there are problems, it is usually possible to export the file in ASCII format, which most DTP software can read. It should be clear by now that new word processors are a potential minefield for external communications. Once again the importance of using a well-known word-processing program is stressed: a discussion on this topic is contained in the ITC handbook *Choix et développement d'un système micro informatique*.

Once input and checked, the final text is transferred in ASCII format, or any other accepted format, to the DTP software. A Windows environment is preferable when cutting and pasting is required between programs, and no more so than when graphics are created or images scanned with other programs for downloading directly into the publication. In practice, a reference style sheet is designed as a template and the text and images poured straight into the empty pages, or put aside and composed on an electronic desktop similar to the method used on the traditional editing desk with glue, scissors, etc. The mouse is used for moving, cutting, pasting, copying, sizing, changing the style sheet, altering character size and inputting page settings within a real WYSIWYG environment.

Windows is capable of modifying the printer configuration on-line, which will then apply to any applications program running under Windows. It is even possible - for Corel Draw and Designer - to configure the slide-making device drivers to prepare a master plate for out-of-house colour printing.

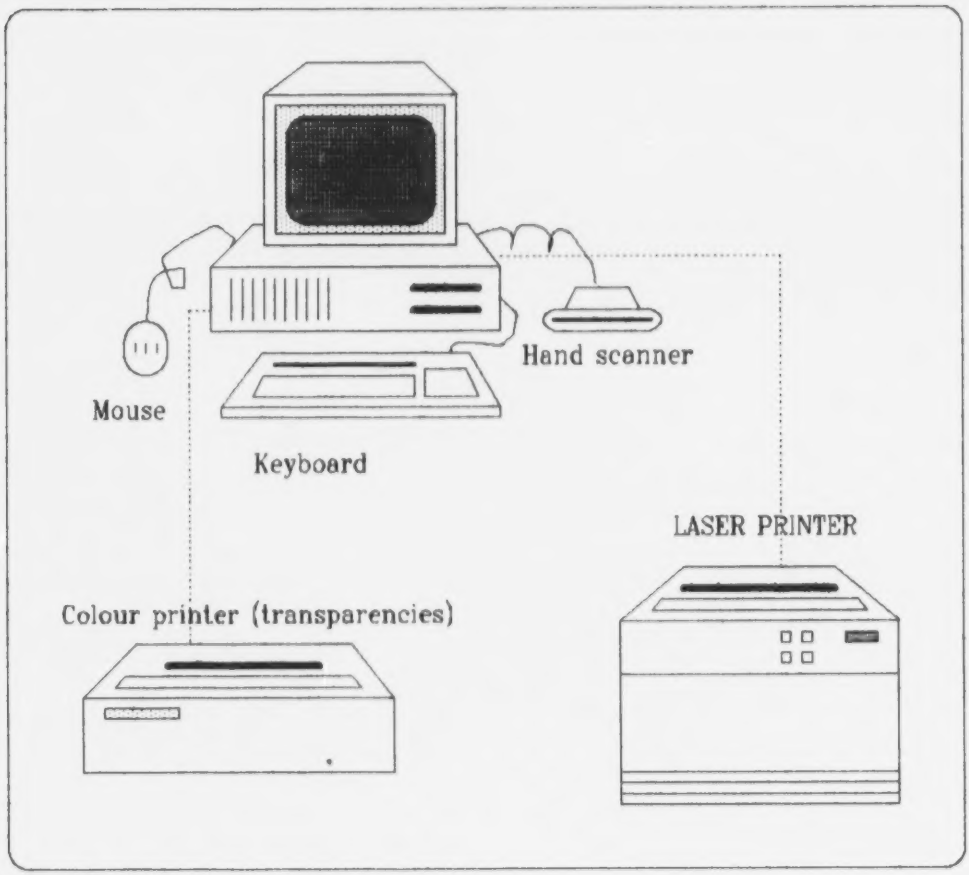
DTP: do's and don'ts

These considerations may appear highly technical, but one thing to bear in mind is that microcomputers are and will remain a comprehensive system. Producing a document, from conception to final printing, should be regarded as an individual production-line requiring keyboard-to-printer skills. Even in large organizations, specialization in just one area of the process is not necessarily advantageous: with individual systems, however, the output can be modified at any time to meet the writer's text or formatting requirements. It may not therefore be very efficient to have the printing

done by someone else. This is why it is necessary to have thorough training on all elements within the system, including technical aspects. Many pilot schemes have failed simply because of a lack of training and knowledge of the equipment. To rely exclusively on staff who are not computer-literate, or on technical specialists from a number of distinct fields, may well lead to poor results. One way of overcoming such a deficiency could be to entrust the production of a single document (or set of documents) to one trainer, ensuring a measure of quality control and rewarding the trainer by having his or her name on the front page.

Figure 3

A DESKTOP PUBLISHING SET-UP



- The colour printer is optional
- The hand scanner can be a full-page scanner

CONNECTIONS:

- The first printer is connected to parallel port 1
- The second printer is connected to parallel port 2
- The mouse is connected to serial port 1, or directly to the PC bus, through the mouse card.

APPLICATION 3. VIDEO-IMAGING SYSTEMS

The impact of the visual image for training is well understood. To maximize this impact, there should be guided discussions to help the participants interact with the message. This is where microcomputer applications are a significant advance towards versatility, compared with the more rigid, standard video training programmes.

Until recently, though, the cost of computer-based images was simply too high for non-specialized organizations - only broadcasting studios could afford the investment. The technology is based on the use of image capture boards (ICBs), which are slotted into the microcomputer. Image capture boards are rapidly falling in price as a result of major technological developments in electronic components and memory size, costing something above $1,000 in the United States. Only six years ago, video-imaging technology could easily cost $50,000.

A videographic board is a card plugged inside the microcomputer and connected to the camera, monitor or other item of the video equipment. The board receives a video signal to capture the 3-D world of people and things in real-time; the trainer, acting as the editor, can then manipulate the pictures and sequences, the end product depending largely on his or her creativity.

All kinds of scenarios can be played with such a versatile system, the only limitation being the participants' level of understanding, and their questions and answers. Computer images, once stored in memory, can be transformed and placed either in a training module, or a database, graphics, or word-processing program, etc., and printed straight out via the computer printer.

In order to facilitate image management, video-imaging software packages work closely with standard PC applications such as dBase, Autocad, PageMaker, and Ventura.

The rest of this section will explore how image processing can be applied to professional training, with an examination of the hardware and software requirements.

System architecture

Most of the present systems are based on professional image boards (PIBs), or computer add-on boards called videographic capture-and-display boards.

Images are captured from a video source and displayed as colour images on analog RGB (red, green, blue) or composite video monitors. Some boards support both the United States (NTSC) and European (PAL) video standards. The standard the board works to must be ascertained, to guarantee compatibility with existing video equipment in the training institution. The board should also be compatible with the computer bus connector, but this is rarely a problem as all boards on the market have an 8-bit standard connector, which fits with all PC, XT, AT and 386 machines. The video-display random access memory (RAM) is mounted on a daughter-board connected directly to the image board. The amount of video RAM varies from 256 kilobytes to one megabyte - the more RAM, the better the screen definition - with 256 kilobytes giving a 512 x 256 video resolution display. This specification gives an acceptable picture quality for training purposes.

For the display itself, a RGB analog monitor and a composite video/TV for dual-monitor use is required. Alternatively, a multifrequency monitor that can operate

to the NTSC signal's 15.75 kHz horizontal-scan frequency can be used for a single-monitor system. Figure 4 illustrates the essential components of a complete imaging system.

Video-imaging systems can be set up in a number of configurations: the basic elements depend on the training applications envisaged. If the training institution already has a DTP system in place, including scanner and laser printer, the only additional item required is an image capture board to get started. Starting the system in this way will reduce costs to a minimum.

Hardware requirements

The key component of a video-imaging system is the image capture board (ICB). Its main function is to transform an analog video signal (voltage, intensity, etc.) into digital data that a computer can process. The ICB is an analog-to-digital converter spanning the two worlds. It works as a graphics processor, separate and distinct from the internal video adapter board. If a standard video adapter board is fitted to a PC, only computer-generated images can be displayed on the monitor. The ICB, however, can grab images as well as display them, but if the microcomputer has a CGA, EGA or VGA monitor, a standard television monitor is required to view the captured image in its composite NTSC/PAL format. Special scanning software will allow images to be input and manipulated in a way that normal digital scanning software cannot. If a video recorder is used, it is then possible to record and save images, which may later be developed into titles, animated sequences, or any other sub-module. If a video camera is added, it becomes possible to capture live images and build them up into an image library stored in the computer - but there is a major problem to this. A stored image can take up to 500 kilobytes of memory, and will soon fill up even a large hard disk: 100 images will take up 50 megabytes. Image compression is therefore required, in order to reduce the amount of hard disk occupied. However, no compression standards currently exist, although IBM sells powerful but expensive compression cards. An alternative to compression is to keep the image data bank on a WORM (write once read many times) optical drive: such a device can store up to 600 megabytes on a cartridge, but access time is slow when compared to hard disks. Some advanced set-ups use a hard disk as a buffer to the WORM drive, and although costing no more, the arrangement is more complex.

Software requirements

An ICB without software is a like car without wheels: more programs are, however, now being produced for capturing, modifying and archiving images. The whole image data bank is held in a format so that it can be read by other software, either DTP or slide-show programs. The standard formats are PCX, IMG or TIFF, and are compatible with the Windows or GEM graphical environments. Editing tools can then alter the captured images by adding designs, blending colours, or adding text: this is where the computerized medium offers greater flexibility than video pictures on their own. It is also possible to place a captured image as a background - perhaps the training institution or a classroom - and fill the screen with motion video or a computer sequence such as titles, sequencing, etc.

In short, a good software program - like HaloVision III - should be able to convert ICB images and display them on a VGA/EGA monitor, change colours, and load and save images in the VGA/EGA environments, for export into a slide-show or DTP program. It may also feature editing tools with drawing capabilities, pixel manipulation, a colour palette and airbrushing; erasing tools with transparent mode for superimposed

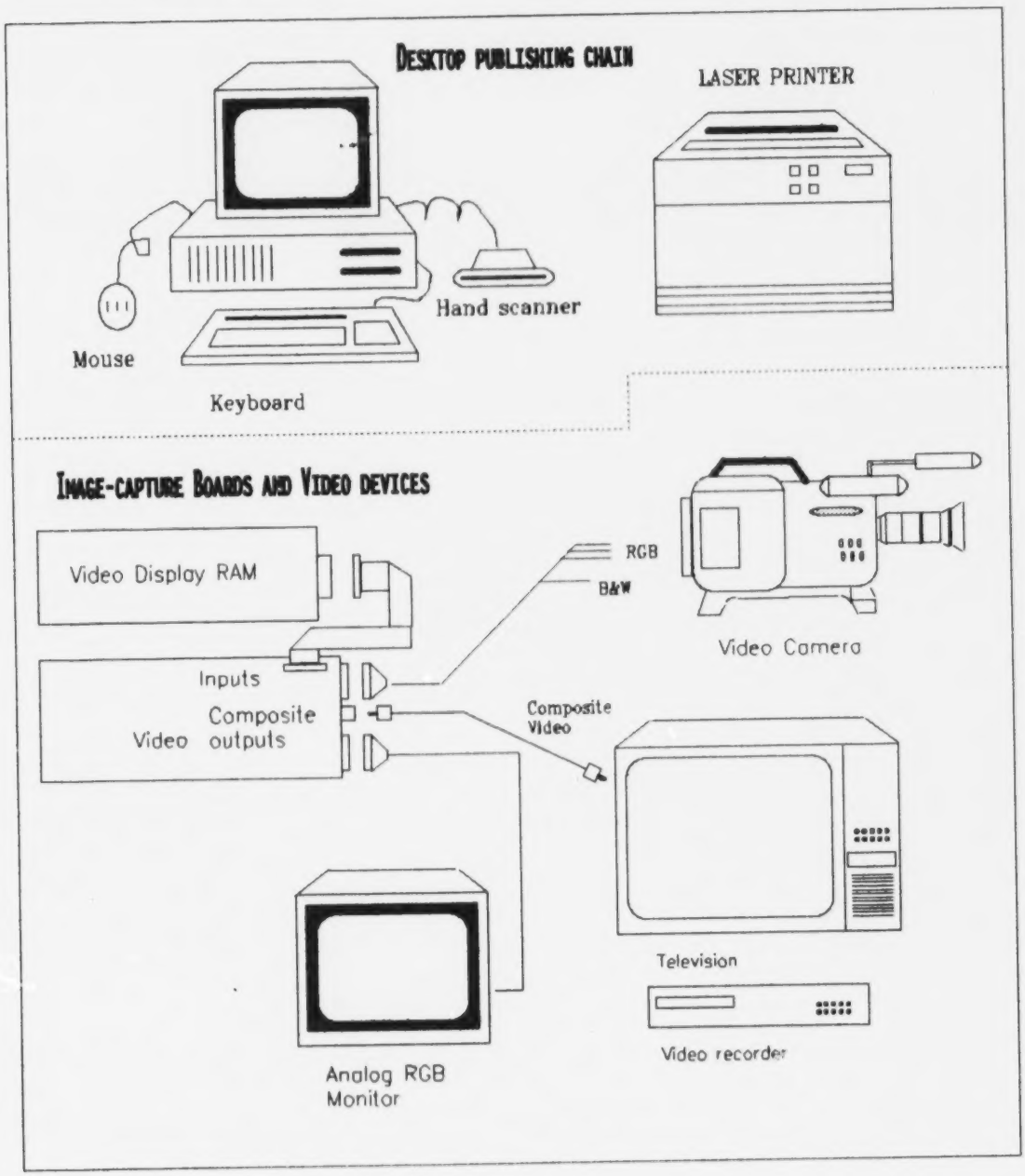
pictures; text capabilities; and printer drivers. These features are now standard, even for medium-priced programs. A good program like Pizzaz Plus offers all this at a reasonable price.

Training requirements

Even if all this new hardware and software is daunting, the technological breakthrough has, in fact, greatly simplified the training process - provided, of course, everything is functioning as it should. Normally, a non-specialist with a minimum of microcomputer knowledge and some video experience needs no more than half a day to master the system. It is not recommended that beginners, including non-specialist trainers, deal with such systems for their first computer application. There are, as yet, no specialists in this field, and full use must be made of the manuals, and the installation procedures followed closely. Users who know the DOS and video worlds can just about make sense of these manuals - it is then that the training process really begins.

FIGURE 4

COMPLETE SYSTEM CONFIGURATION FOR IMAGE CAPTURE AND DESKTOP PUBLISHING CHAIN



APPLICATION 4. DEVELOPING EXPERT SYSTEMS

Artificial intelligence will probably be the most important single development in training technology in the 1990s. It will revolutionize training professionals' whole approach to improving their performance and to their own role as advisers.

Until now, the aim of training has been to improve trainees' knowledge, proficiency and skills. In other words, "skills enhancement" has been the focus of training. In the near future, professionals' expertise drawn from their experience will be encapsulated in computerized expert systems which any trainee will be able to access for information and advice.

The training manager will, therefore, become less a provider of training courses and/or open learning resources, than a knowledge engineer who identifies the best practice and latest techniques, and then incorporates them into computer programs for distribution. There will thus be less of a need for people-led training as the emphasis moves towards providing support systems instead.

All trainers and training institutions need to be aware of this new technology and start to plan its introduction. The result should be improved productivity, higher quality of work, and lower costs.

Expert systems can be used:

- To provide step-by-step guidance on how to perform any task, however complicated. They are highly suited to helping all levels of staff tackle new assignments better, and to introducing new business procedures.
- To provide specialist advice in fields such as quality control, packaging, trade regulations, customs procedures, etc.
- To upgrade decision-making in all areas, e.g. marketing or finance.
- To diagnose problems in, for example, production, marketing or distribution.
- To reduce human error in repetitive or costly operations.

The most progressive training institutions and business schools in developing and developed countries now provide services to those companies willing to benefit from the teachers' and trainers' expertise and experience. The trainers must therefore also have proven skills in foreign trade, or at least have at their disposal tools and methods to help the companies they are working with. In this way, training becomes an advisory rather than a didactic activity, and can therefore be charged at the same rate as a professional service to commercial organizations and other clients. It is no surprise, therefore, that more and more training institutions are developing consultancy services for the business sector.

In order to help such training institutions incorporate an innovative computer-based tool into their training programmes, ITC has developed a microcomputer program to assess COmpany REadiness to export, known as ITC-Core. Seminars or workshops for non-exporters or new exporters can be based on the program.

ITC-Core provides an evaluation of company strengths and weaknesses in relation to exporting, and is particularly useful for small and medium-sized companies considering exporting for the first time. As well as giving to the company an estimate of its export readiness, ITC-Core also recommends certain export-related measures. A subject-by-subject guide to export marketing is also offered.

When used for consultancy purposes, ITC-Core enables the trainer to:

- Assess the client company's export readiness systematically and thoroughly;
- Make further recommendations based on those supplied by the program;
- Design a plan of action or a tentative marketing plan for the client;
- Qualify the client for future export assistance;
- Design customized training programmes for company executives.

It should now be apparent that ITC-Core, when used selectively, can become a powerful tool for training business consultants and trainers.

ITC-Core guides the user through a series of questions on the company's organization and products. The program then compares this information with the company profile of an "ideal exporter". This profile may not be the same in all fields, as it has been developed from the point of view of international business. The company's potential weaknesses and strengths are highlighted and analysed. Organizational and product readiness ratings are generated, and various options for commencing export operations are recommended.

The program itself is built in such a way that it does not require any degree of computer proficiency on the part of the user; the software has been developed for simplicity of use. However, the extended version allows consultancy and computer professionals to adapt the messages and weigh the replies to reflect different exporting environments, and to personalize the questions and messages.

The ITC-Core recommendations provide a basis for the training institution and trainer to prepare a customized export plan and to allow discussion of parallel training programmes in the company. The viability of the trainer's own analysis is often enhanced by the computer-aided assessment, provided he or she can justify the proposals. The educational value of the programme is further strengthened by the inclusion of a number of tutorials in the *Step-by-Step Guide to Exporting*. Finally, training institutions can use ITC-Core in their diploma courses and seminars in international trade. As an applied tool which facilitates participant involvement, ITC-Core is an ideal way to structure part of a productive course or seminar, and to allow certain "what if" assumptions to be checked by means of discussions on the ITC-Core proposals.

Hardware requirements

An IBM-compatible microcomputer (even the basic PC-XT) with 510 kilobytes of free RAM; a hard disk with 2 megabytes of available hard disk space; and a standard printer, preferably with 132-column capacity. Creating a new expert system requires a more powerful AT 386 SX or equivalent, with 2 megabytes of RAM; and a fast access (30 millisecond) hard disk with 30-40 megabytes of free space.

Software requirements

The ITC-Core program requires no special software. For specialists who are willing to modify the program itself, a good text-processing program which can save text files in ASCII format is sufficient. It is perhaps superfluous to add that modifications to the program should only be undertaken by those with wide experience of computers - including conditions and statements - and of export. A powerful knowledge-generator program is usually required to build a new expert system, but there are as yet few on the

market, and most are based on Prolog. Whereas Knowledge-Pro is recommended for more complex programs, simpler programs such as VP-Expert can be used as an introduction to this subject.

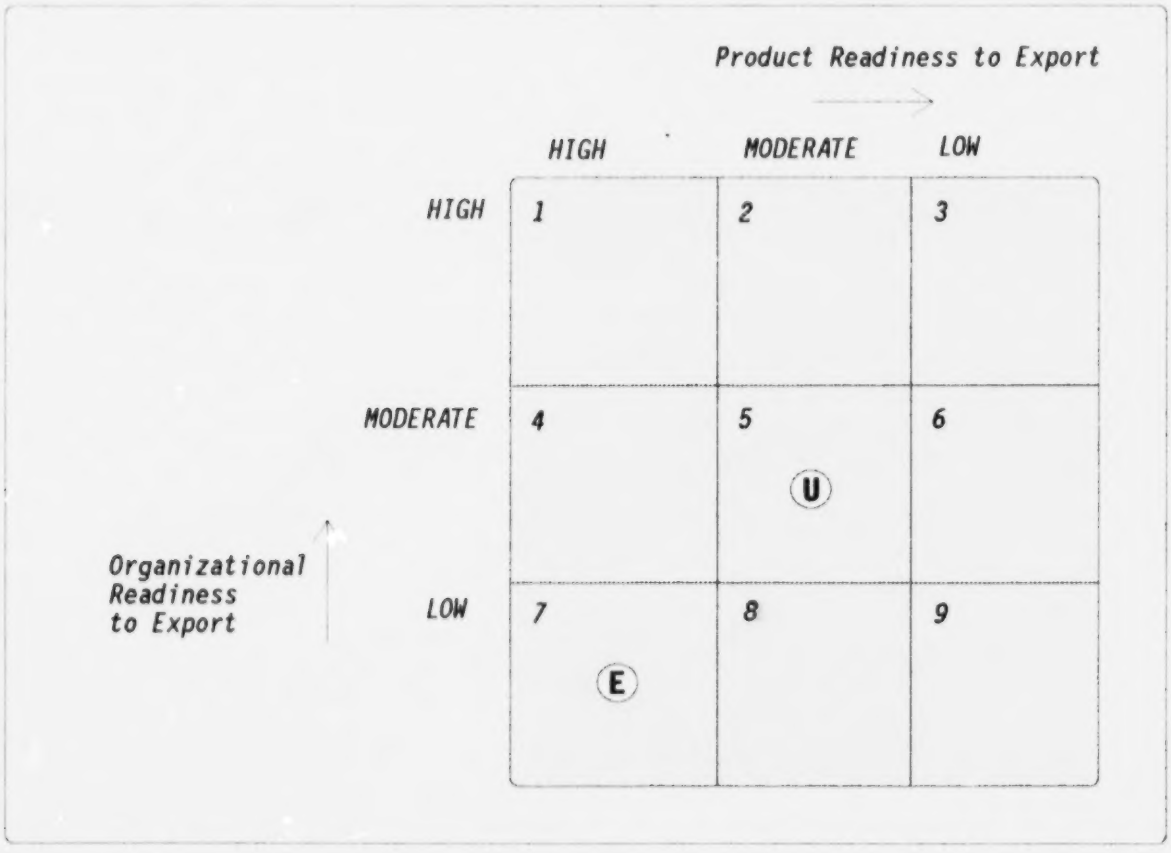
The future of expert systems

The ITC-Core program is a good illustration of a growing trend towards expert systems. Expert systems can be developed for any purpose, as specific as an export pricing exercise, or as wide-ranging as a system for deciding on strategy. It consists of two elements: a set of rules which summarize the expert's statement in the form of "if...then" conditions; and a knowledge base - the larger the better, for consistency and authenticity. Expert systems are generated by specialized software that constructs an internal logic under the writer's control: ITC-Core, for example, uses Knowledge-Pro. Anyone with a particular expertise but no special computer knowledge can therefore build an application, even for in-house use such as filling forms. An expert system may be employed to supervise the data entry of an export clerk when filling in a customs declaration: the program places the data in the proper box and fills the form only if the answer or information fulfils the requirements for that question. If these requirements are not met, help messages appear, guiding the user through the whole process. Control over large spreadsheets can also be developed, in conjunction with top of the range data-entry control systems, and context-sensitive "hot keys", and so on.

These techniques have been incorporated by the software houses into the ever increasing number of tutorials shipped as full training packages together with the licensed copy - a good example of this being Windows 3. Teach-yourself computer programs are therefore highly flexible, and allow everyone to benefit from the fruits of the specialist-developer's experience. There is every reason to expect such methods to be used in ever more complicated programs. The more advanced training institutions should perhaps consider giving incentives to their best trainers to encourage them to produce more of their own expert systems: these systems could then be exchanged with other training institutions. In fact, the feasibility of ITC-Core has led to the production of an offshoot program for selecting a freight forwarder. Other modules are under development for joint ventures, the selection of distributors, etc.

Figure 5

ITC-CORE ASSESSMENT GRID



AT THE END OF THE EXERCISE, THE EXPERT SYSTEM SCORES THE USER'S ANSWERS AND PLACES ITS OWN EVALUATION ON THE GRID, AFTER REQUESTING THE USER'S OPINION ON THE MATTER. COMMENTS AND SUGGESTIONS ARE OFFERED FOR POSSIBLE COMPANY IMPROVEMENTS IN ORGANIZING THE EXPORT BUSINESS.

(U) = USERS' ASSESSMENT
(E) = EXPERT SYSTEM'S ASSESSMENT

(C) ITC-Training Section

APPLICATION 5. NETWORKING and COMMUNICATIONS

Background

The time will come to plan the exchange of documents and data with other institutions. This assumes that certain applications have already been developed and that a small but expanding database on training materials, research papers, small documents, etc. has been established. The ITC is currently considering establishing a pilot computerized database which will be of interest to training institutions and business schools offering in-career export training programmes.

It is perfectly feasible for training institutions that are willing to share information to set up a centre for exchanging data bank information, provided that their hardware and software are compatible. It then becomes possible to access a wide range of external information and documents throughout this network on a cost-sharing basis. One common language should be adopted by everyone using the system. This usually means that the best working area is a linguistic region, so, for example, French-speaking North African training institutions with similar foreign-trade promotion programmes could form this type of network. A common database of training materials would then be accessible to each participating organization. Diskettes would be the medium for transferring data, provided that everyone has compatible programs and equipment. Regional libraries could then be established, with several training institutions working towards a common, shared resource centre. Problems of language, however, may well be overcome in the future with microcomputer-based language translating systems. Although such systems are not yet operational, research and development is making remarkable progress in this area, and perhaps within a few years, microcomputer users as well as those with limited computer experience will be working with them. There is, in fact, a North African management school whose microcomputer applications trainers and researchers are working on a system for translating French into Arabic, on a word to word basis, with limited syntax. When positive results are obtained, the platform for data exchange will expand considerably.

Such a system for exchanging data requires both a local area network (LAN), and communication facilities to remote data banks for exchanging programs and results. For trouble-free access and communications, the hardware and software should be carefully selected to help ensure that they can still be used when new communication methods are offered.

A typical LAN consists of interlinked personal computers and is the backbone of an automated office. It allows users to exchange electronic mail and to share hardware or database information quickly, easily, and reliably.

Alternatives to a LAN or a remote-access system

Before installing an expensive system, it is advisable to balance the needs and solutions carefully against the cost involved. An organization with relatively few PCs may prefer to use a minicomputer or a multi-user microcomputer system instead of a LAN. Such computer systems offer all the hardware and software facilities of a LAN. Terminals could be a cheaper alternative to microcomputers, but two things must be borne in mind: the price of standard PCs has dropped considerably to around $400 for XTs and $800 for ATs; and in the developing world, the choice of minicomputers or mainframe computers is still very limited. They are also very expensive, probably costing more than a basic LAN (a base model PC and one AT 386 file server).

Some training organizations may wish to steer a middle course between having an expensive LAN and no network at all, with inexpensive and uncomplicated circuit-switching devices. These devices can link two PCs to a printer, or a PC to two printers and a modem, or two PCs to two printers and a modem... the list goes on. These switching boxes are slightly larger than standard modems with simple mechanical circuits: they are ideal for individuals or training institutions that do not need the power and multi-user capabilities of a full-scale LAN. However, expansion capacity is limited, and the distance between devices must be as short as possible.

Some training institutions may consider installing networks for classroom training. For teach-yourself applications, this is a bad idea: a better solution is for each student to work on stand-alone PCs, making his or her own mistakes - including erasing files - and developing his or her skills without outside interference. A LAN would require someone to oversee the system, maintain all connections, and be available for solving everyone's problems, and so on. This would seem to be a waste of time and ability which could be used to better effect elsewhere. In addition to this, a LAN for classroom use only becomes very expensive. Even if the network has been donated or is part of a promotional exercise, experience shows that LANs have hidden costs which far outweigh the initial cost saving. If a workstation crashes - causing the whole network to hang in low-level systems - the user customarily has a long wait until the system is up and running again; a stand-alone machine is easier for non-specialists to maintain and repair. It is well known that classroom machines need to be repaired far more often than other hardware.

There are occasions when PCs are in place and a mainframe is accessible: this may happen in administrative offices that do not use the mainframe all the time. In this situation, a micro-to-mainframe link is needed, and is provided by a 3270 terminal emulation card fitted inside the PC. This card resembles a LAN adapter card and is installed in the PC itself, preferably by a professional who knows the microcomputer and mainframe computer worlds. The card and related software make the personal computer operate like a 3270 terminal, permanently connected to the mainframe. The only costs of connection are the card itself - maximum $1,000 - and the communications system or cable - telephone and modem, or coaxial cable for short distances.

If the institution decides to go ahead and install a network, a topology type (network language for structure) has to be selected. The network can either be a local area network (LAN) as discussed earlier; or a wide area network (WAN) which has remote-access capability. Connection to other remote systems can only be made if protocols have been established. Figures 6 and 7 show various LAN topologies and remote connections within an existing network.

LAN hardware requirements

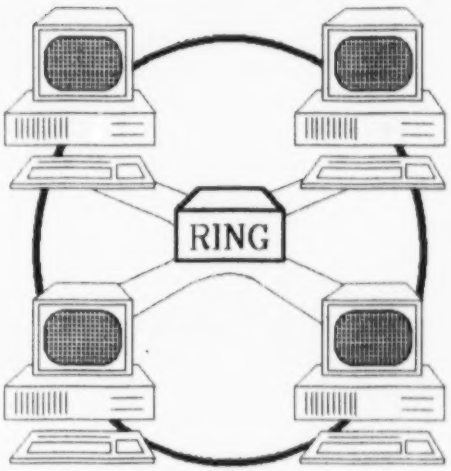
It is assumed that the PCs for the LAN are already available. The first decision involves selecting or upgrading the PC to be used as the file server, i.e. the machine that will manage internal and external data, and which will be connected to the workstations. The server should be the most powerful unit the institution has.

The basic unit should be a full 386 IBM-compatible machine, with at least 2-4 megabytes of RAM, 80-120 megabytes of hard disk or disks, and a monochrome or VGA screen. It is, needless to say, expensive.

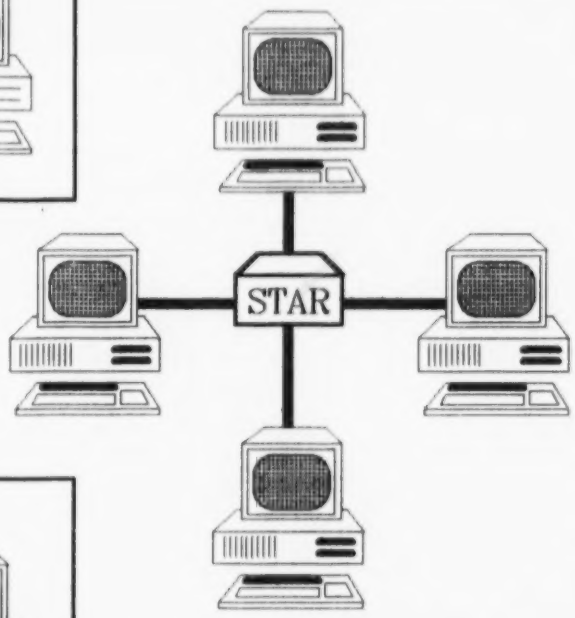
Printer quality is not crucial as the printer is only used for checking programs and listing data provided by external data banks. A laser printer is preferable because it prints silently and quickly.

FIGURE 6

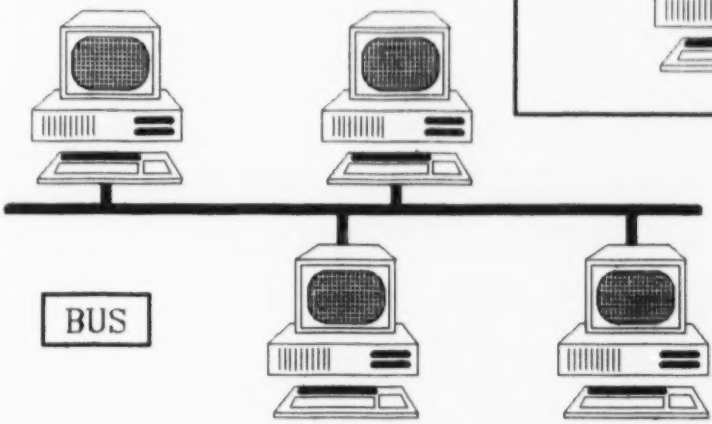
THE LOCAL AREA NETWORK TOPOLOGIES



In a RING NETWORK, workstations are linked in an unbroken chain. The IBM Token Ring Network is an example with the central RING box acting as a wiring hub.



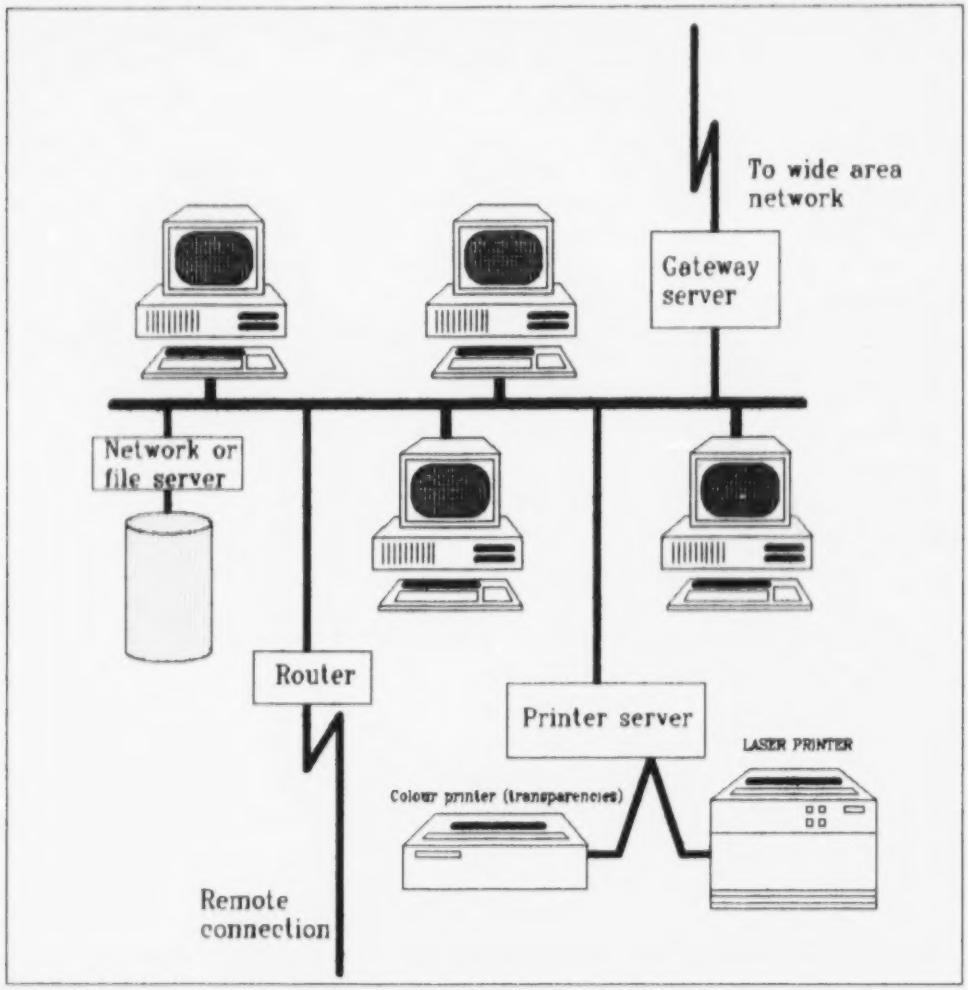
A STAR NETWORK has work stations clustered around a computer which acts as a central controller, or "switch".



In a BUS NETWORK, workstations are linked via a single cable and contend with each other to transmit messages. (e.g. ETHERNET)

FIGURE 7

INTERCONNECTED LOCAL AREA NETWORKS USING SEPARATE DEDICATED FILE SERVERS



Every device on a network has a unique address. It enables one workstation to send a message or transfer a file to another attached device.

Specialized servers are called from the network or from routers or gateway servers, within the inside network.

Network software in each personal computer executes the file transfer.

Any user in the network can interact with a document created by another user and may modify it (if authorized).

The document or any other file that is received, can be changed, and a copy made, before being returned to its originator, provided the network "administrator" permits it; some operations are privileged so that protected documents cannot be altered, unless certain procedures are followed, or passwords entered, by the user. For example, users may access the training institution database according to privileges granted to them, such as

1. *Read records only*
2. *Add and delete records*
3. *Update records only.*

Inside the LAN

The key component of these systems is the communications card and cable. Cards are connected to each other with twisted pair cable (as used for telephones) or coaxial cable, or even, in some advanced applications, fibre optic cable. A card, plus software, is fitted to each workstation. Workstations are interconnected using star, ring or bus topology (see figures 6 and 7). All the workstations (known as slave units) can be the same; the file server (known as the host unit) must be more powerful. Power and versatility are essential for the file server: it should be mainframe- and PC-compatible, in addition to being able to communicate with non-standard systems, such as Minitel (used in France). The slave units have no such power requirements. On this analysis, the Ethernet card - using bus topology - is excellent value, but expensive. At the other end of the scale, the simplest system consists of a multi-function card, supplying one parallel (LPT1) and two serial (COM1 and COM2) ports along with communications cable and switch. Connections, however, are limited to short distances (three to five metres), with a maximum of four interconnected workstations.

Before buying, the vital questions are:

- Is the total cost reasonable and within budget?
- Does it meet specific requirements?
- Is it possible to start with a small outlay, and gradually expand to encompass more complex applications?
- Are the communications designed to prevent the whole network from crashing?
- Is the network compatible with equipment supplied by more than one vendor?
- Is it easy to install, maintain and interconnect to other networks, to switch hardware around, and to reset software controls without adversely affecting other hardware and software?

External telephonic communications using fax and modem cards

It is possible for workstations in the LAN to communicate with the outside world through telephone lines, and to do this they need to be fitted with either a fax or modem card. Fax transmission can be made either through an internal fax card, or a separate, stand-alone fax machine. Modem cards allow computer-to-computer data-communications only; fax cards, on the other hand, enable images to be transmitted in bitmap mode to either another computer with a fax card fitted, or to a stand-alone fax machine. A computer fitted with a fax card must be connected to a printer to print out the transmission, and to a scanner to capture it. Recently, combined fax and modem cards have appeared on the market, but it should be remembered that a fax card requires a scanning system to construct a bitmap image to send; there is also the disadvantage that the whole system is required to send or receive a document, and it only needs one element to malfunction - e.g. software, file format, printer compatibility problems, insufficient RAM - and the whole document is lost. A separate fax machine is therefore recommended, perhaps connected as an external device.

Advantages of an internal fax-modem card:

- Everything is integrated within a single system: minimum additional spending is required and more efficient use of the existing equipment is possible.
- Communication links can be established from inside a program that is already running; batch files can be used for connection to data banks to simplify the procedure.
- Data and software interconnect easily, i.e. a file received by modem or fax can be used immediately within word-processing or other programs; and requests to transmit can be processed immediately, either inside or outside the LAN.
- The PC can be programmed to transmit or receive during cheap rate periods - usually at night or at other times - and to automate connections.
- There is no need to use expensive (but silent) thermal paper, as the computer printer will be used.

Disadvantages of a fax-modem card:

- A scanner that is compatible with the system is required. Full-page scanners are costly, and users of hand scanners need good practice to scan properly without distortion.
- Not all programs guarantee compatibility, as no real standard has yet been accepted by the manufacturers: a computer professional is therefore required to carry out the installation.
- The telephone line is not available during transmission except for multitasking programs, and these require expensive 386 machines.
- The printer may be required any time an incoming message appears. Multitasking solves this problem, but again, at a high cost.

Analysing their requirements in terms of the money available, training institutions may be well advised to wait until a common standard materializes, together with foolproof systems and communications protocols. PTTs in most developing countries have not yet approved fax or modem cards for use on the national telephone system. Moreover, the speed (or baud rate) at which the national telephone network can handle this information is lower than the computer's capacity to send or receive it: this may add to the cost of telecommunications, particularly when long-distance calls are made regularly.

For a single user, the cost of accessing an external on-line database is relatively high. However, with a LAN, several training institutions can share this cost - they could even share the access charges with the exporting companies for whom they perform consultancy services. The field of research is then widened considerably, for the benefit of trainers, advisers and exporting company managers. In order to provide guidance on this ITC publishes regularly updated lists of on-line databases for use in international trade. (See the Bibliography.)

Software requirements

Various programs are required for computer communications: for the LAN, including connection to mainframes; for telecommunications access; and for data processing (text or images), etc. The aim is for the programs to work harmoniously together. This requires the services of a computer professional, or even a full-time programmer, who will not only write the interconnection programs, but also maintain the system hardware and software. It is not, therefore, advisable to rely on the average dealer or importer, unless he knows the system thoroughly: unfortunately this is all too rare.

Although standard communications packages such as Procomm or Crosstalk are good, they cannot easily be integrated into different text-processing or bitmap programs. A complete on-site analysis is indispensable. This will add to total expenditure, and should take into account the training period required. The communications system should not be available to everyone: a mistake when entering or leaving the program could result in astronomical telephone charges, simply because the line is left open at the end of a transmission. Such mistakes are certainly not paid for by the other party or the PTT. By way of illustration, the following table shows the hidden cost of a communications system expressed as a percentage of total costs for a LAN plus external connections.

PROBLEMS to solve	5 workstations	20 workstations
LAN installation and management	48%	36%
User training	17%	22%
User-associated problems	16%	25%
Network hardware and software	8%	9%
Specialist maintenance staff	8%	3%
Communication protocols and agreements with the PTT	3%	5%

Source: *PC Week*, 7 April 1987.

Developments in computer communications: the key role of agreed protocols

Two of the aims of computer communications standards are:

- To allow any computer or terminal to communicate with any other computer or terminal.
- To allow simultaneous voice, data, and full-motion picture transmission over the same public telephone channel.

These aims can only be achieved if common communications standards are established. Communications engineers within the largest computer companies are currently developing Integrated Services Data Networks (ISDN), while international committees are trying to establish standard rules, or protocols, for these networks to work

to. However, political and security concerns have led some countries to restrict the flow of data abroad, but despite this, international standards for public packet networks already exist: they are known as X.25 protocols. These are part of a seven-layer structure for interconnecting communications devices established by the International Organization for Standardization (ISO).

A second emerging standard is the Advanced Program-to-Program Communications (APPC) protocol from IBM. This allows one computer to communicate on a peer-to-peer basis with another that uses the same standard. At present, personal computers operate in a slave relationship, as terminals do, when communicating with mainframes and minicomputers.

A third emerging standard is X.400, which will allow electronic mail services around the world to be integrated. It will enable the user to send and receive messages anywhere, irrespective of the protocol used to initiate the mail.

It seems clear that a training institution which is willing to develop microcomputer research according to these new standards will considerably enhance its image at regional and even interregional level. This would involve a regular exchange of information, even at an informal level: after all, the only parameters a modem has for communicating are a mutually agreed protocol and a telephone line. Such activities are likely to increase in the coming years, with more and more training institutions participating. At the present time, many opportunities for interconnecting training institutions are not being exploited, including the sharing of development costs. Costs, in addition to human and technical resources, can be shared for the benefit of all concerned, if a long-term, committed development strategy is formulated.

Trainers who have access to research and development tools in this area will be at the forefront of educational technology. They will be able to improve and remodel their training programmes while expanding their institution's capacity to offer the type of practical training required by businesses.

Real applications: remote-access databases at ITC

ITC has developed several regularly updated databases for foreign trade research and development purposes. Trainers and teachers whose terminals or microcomputers have remote-access capabilities (modem plus protocol plus telephone line) can download these data and undertake their own research. For training institutions which do not have these capabilities, the data are available on diskette.

The databases are listed in the bibliography. It is not the purpose of this document to show how these applications work. However, those training institutions willing to add a new element to their training programmes and curricula will probably find them very useful. An example is given in the appendix as the transparency "The Fastest Growing Products in World Trade". The data was extracted from the ITC database "Top 200 World Trade Products", which in turn was developed from the Comtrade database.

ITC databases currently available are:

CATEGORY	COVERAGE	FORMAT
A. TRADE STATISTICS		
COMTRADE (UNSO)	Import/export data of over 120 countries	Large volumes: magnetic tapes
	- In SITC Rev.1 since 1963 - In SITC Rev.2 since 1978 - in SITC Rev.3 for 1991	Small volumes: diskettes * printouts *
ITS (ITC/UNSO)	Imports into 31 markets during 1984-1988	Microfiche
	Profilimport analysis of individual exporting countries	Printouts, free
	Export performance of developing countries taken by region, using the Glance/PC program	Diskettes *
B. TRADE CONTACTS		
TRADERS (ITC)	About 12,000 importers and 7,000 exporters	Printouts * Magnetic tapes* Diskettes *
PROMORG (ITC)	Directory of trade promotion organizations	ITC/EBB publication (free)
DIRIMP	Directory of importers' associations	Publication (free)
UK IMPORTERS	4,000 profiles of British importers	ITC/EBB (free)
C. MARKET REPORTS		
MARKET BRIEFS (ITC)	over 100 subjects covered (selected product/markets)	ITC/EBB publication (free)

D. PRICES OF SELECTED PRODUCTS, FROM THE ITC MARKET NEWS SERVICE

Each of the following files can be transmitted by telex, fax or newsletter, or can be accessed on-line via the MNS/EBB, for an annual subscription of $250 per file:

FILE	COVERAGE	PERIODICITY
HE	Horticulture/Europe	Every Wednesday 6 p.m. **
HA	Horticulture/United States	Every Thursday 6 p.m. **
FE	Cut flowers/Europe	Every Thursday 6 p.m. **
FA	Cut flowers/United States	Every Friday 6 p.m. **
SW	Spices (world)	Every Tuesday 6 p.m. **
LE	Leather (world)	Every 2 weeks (Friday 6 p.m. **)

Currently being loaded into the MNS/EBB:

FILE	COVERAGE	PERIODICITY
TT	Tropical timber (world)	Every two weeks (Friday 6 p.m. **)
JW	Juices (world)	Once a month
Newsletter	United States market	Once a month
Newsletter	Europe	Once a month

* Charge based on output volume. Estimated cost to be requested from ITC, and advance payment by cheque required before preparation of data.

** Geneva time.

Abbreviations and acronyms:

ITC/EBB: Electronic Bulletin Board of ITC: on-line access for external users with passwords. Contains various small ITC databases, and permits data to be exchanged with ITC by electronic mail. ITC does not charge for this service; the only costs are standard telecommunications charges. For more information, refer to: *ITC Trade Information Services Accessible On-line through Telecommunication Networks.*

MNS/EBB: Electronic Bulletin Board operated by the Market News Service of ITC: a yearly subscription provides on-line access and password to external users.

SITC: Standard International Trade Classification, Revisions 1-3

UNSO: United Nations Statistical Office

Section 5

Conclusion and recommendations

The first step a training institution has to take - when faced with the continually changing and challenging world of computers, and often on a limited budget - is a needs analysis to establish why computerization is required, and a formulation on how it is to be implemented. Further details on this first step have recently been released in the ITC publication *Choix et développement d'un système micro informatique*, 1990 (ITC/076/E3/90-I).

Once the results of the needs analysis are known, the system can be chosen: it should be based on industry standards for hardware, software, and communications.

If several workstations are to be bought, it is advisable to assign to each workstation a well-defined task, e.g. LAN database management, or desktop publishing. In the case of database management, the database workstation should be attached to a basic printer for producing long computer listings, whereas the desktop publishing workstation should be fitted with a large (19-inch) monochrome screen and laser printer. Printer-sharing is not recommended for small LANs whose workstations perform a wide variety of tasks, unless there is a compelling reason for it. Cost is not a reason, as two ink-jet or low-cost laser printers are less expensive than a single, fast laser printer.

Technical requirements

It should be remembered that microcomputer systems (including LANs) consist of interdependent devices, and their performance is determined by the weakest link. A fast processor is not essential for workstations - unless used as a file server - but a recommended minimum speed is 20 MHz. At the present time, a machine with a 386 SX processor may well offer a good compromise between the conflicting demands of price and power, as such a processor is adequate for nearly all microcomputer programs, including the most recent multitasking software. When networking is envisaged, a wise move is to start as simply as possible, and gradually extend the number of workstations in the LAN. Starting big will create many unexpected problems, and increase maintenance and training costs.

Fax transmission is now considered essential, and a stand-alone fax machine - soon to be available for normal paper - is the recommended system. The computer-based

fax-modem-scanner system may prevent the workstation from being used for anything else for long periods if the incoming or outgoing transmissions are numerous and/or frequent.

Training requirements for all system components

Training is not just for the specialists who have installed the system and got it running. Everyone who uses microcomputers should be trained, not only on the system they are going to use, but also on the components in the system. This is the best way to understand how to keep the system in good working order, how to react to computer messages on screen, how to change paper, how to set up a screen, and how to check a printer or telephone connection without continually disturbing the specialist for a job anyone can do! Unfortunately, due to lack of time and pressure of work, the training process is frequently cut right back. Consequently, the anticipated increase in output often fails to materialize, and the money spent may appear wasted.

An example of this is that secretaries are often trained in word processing only, as, it is frequently assumed, this is the only type of software they will use. The result is that they may not even be able to copy a file or make a back-up. Lacking an understanding of the whole system, they are therefore reluctant to change their habits even if it increases their efficiency as, for example, when new, integrated word-processing software is installed. Worse, because nobody has ever explained the fundamentals of DOS, they are unable to manage their own files within a hard disk. The result is wasted hard disk space, lost files, and cluttered systems; and in networks, the system may frequently hang. There may also be an unwillingness to master new situations due to a lack of understanding on how the whole set-up works.

Inadequate training can be very expensive: if, during a telecommunications session, the user sees unfamiliar messages and abruptly cuts the whole session, the line may be left open leaving the bill to mount up, minute by minute.

These remarks apply equally to trainers, who usually require more training in the graphical environment, and in networks. If the training is not provided, the workstation will rarely be switched on, or expressly reserved for the "specialist" who will have no incentive to produce documents for anybody else.

The greater the specialization, the greater the need for training: the heads of training institutions should understand that their staff need time to master these new techniques by performing them themselves, once the external consultants or professionals have shown them what to do. Incentives should be offered to trainers who become proficient on their micros. It does not cost the training institution anything to accord recognition to those who train their colleagues, or to allow the author's name to feature on the front of published documents; but it does give management a chance to motivate its best personnel.

Appendix

The appendix contains:

- Detailed specifications for microcomputer equipment required for the production of visual aids and desktop-published training materials.
- A cover page from the *ITC Catalogue of Training Materials*, produced with a DTP package (PageMaker, under Windows). The rest of the catalogue has been prepared as a database using dBase, from Ashton-Tate. The database can be accessed, downloaded and managed through a LAN by a training institution with the appropriate equipment.
- Examples of overhead transparencies as used in typical training situations:
  - Effectiveness of different teaching methods;
  - Trainers as developers of human talents;
  - Training is a 3-way partnership;
  - Designing training programmes: Steps and key questions;
  - Fastest growing products in world trade, in $ million.
- A case-study entirely developed with a DTP program (PageMaker). The graphic on the front page and at the bottom right of every page has been scanned with a hand scanner, retouched with Paintbrush Plus under Windows, and exported to PageMaker.

A. Detailed specifications for microcomputer equipment required for the production of visual aids and desktop-published training materials

The documents shown on the pages that follow have been designed and produced on standard microcomputer hardware, which is easy to acquire and maintain in developing countries. More than 100 manufacturers currently manufacture and sell similar personal computers world-wide. For further information, please consult the ITC guide on the use and development of microcomputer systems *Choix et développement d'un système micro informatique*, 1990 (ITC/076/E3/90-I) (in French only).

The standard equipment listed below is IBM-compatible, and so works with all DOS-based programs.

Microcomputer: an IBM AT-compatible machine, with a 16-MHz 80286 central processing unit (CPU) and a 1024-kilobyte main memory; a multi-function board with 2 serial and 1 parallel ports and 1.5 megabytes of RAM; a VGA (or Hercules monochrome) card; a hard and floppy disk controller board, for 5.25 and 3.5 inch floppy disks, with room for 2 hard disks. The most recent 386 SX machines are a good choice for about the same price, and run at twice the speed of a 286. If DTP-intensive work is envisaged, a fast (25-MHz) 386 is necessary, with a fast access hard disk of at least 60-80 megabytes, with 2-4 megabytes of RAM: the price, though, will be at least two or three times higher, at $6,000-$10,000.

Storage units and hard disk(s): 40 megabytes at least per hard disk, with 25-millisecond access speed. Seagate and Miniscribe are two of the leading manufacturers. A back-up unit is highly recommended for large databases. For more powerful systems, a compact disc (CD) device would be desirable for read-only operations or for storage on special medias such as WORM devices. A single CD can store more than 600 megabytes, and data cannot be erased. Recently, hard disks with removable cartridges have started to appear - Syquest is one manufacturer - and if they turn out to be reliable, they could be the best solution. They are safe, quickly loaded, with a quick access time (a claimed 23 milliseconds), a SCSI universal interface for the controller. They sell at a realistic price of $600 for 40 megabytes, plus $40 for each additional 40-megabyte cartridge.

Floppy disks : both the disk drives (5.25 and 3.5 inch) should be high density. Both disk sizes are required to ensure compatibility with IBM PS/2 systems.

Monitor: this should be a 14-inch multisync display unit. A monochrome Hercules-compatible monitor is perfectly workable for DTP purposes. A resolution of at least 640 x 480 is required for the screen. Some 19-inch full-page monitors are not compatible with certain graphics programs, and are very expensive; they also need their own adapter card. They are best used for computer-aided design (CAD) purposes.

Printer: a Hewlett-Packard Deskjet Plus using ink-jet technology, with two additional font cartridges: Letter Gothic and Presentation. An alternative is a laser printer, but the price is much higher for the same quality. If fast printing is required, laser printers are preferable. The ink-jet system is reliable because it is simple and modular. A dot matrix printer should be avoided because of noise and poor print quality, making photocopies and reproductions difficult to read. Inexpensive laser printers have started to emerge on the United States market, and could represent a good buy.

External devices: a Microsoft-compatible mouse and a hand scanner, perhaps the DFI HS-3000 Handy Scanner or LOGITECH equivalent. Recently, colour hand scanners have appeared; they can be used only if a colour printer is attached.

Price: for the standard configuration (including the printer) described above, an average price should not exceed $6,000-$8,000. Maintenance should be minimal as all components are interchangeable, including the hard disk, option boards and external devices. Direct mail supplies from the United States could bring the price down to $4,000 - but no technical support is offered.

Networking and communications: the above configuration does not include a modem or fax board for networking. The type and cost depend mainly on local regulations and telecommunications protocols. In the United States, a standard modem can be bought for $60 through mail order, and a fax board for $200. They are either fitted as cards inside the computer, or are sold as external devices. They can access any data bank world wide. For local networking, an Ethernet card is the best choice at $2,000, as it also allows access to mainframes.

B. Examples of visuals and training documents developed with the equipment listed in A.

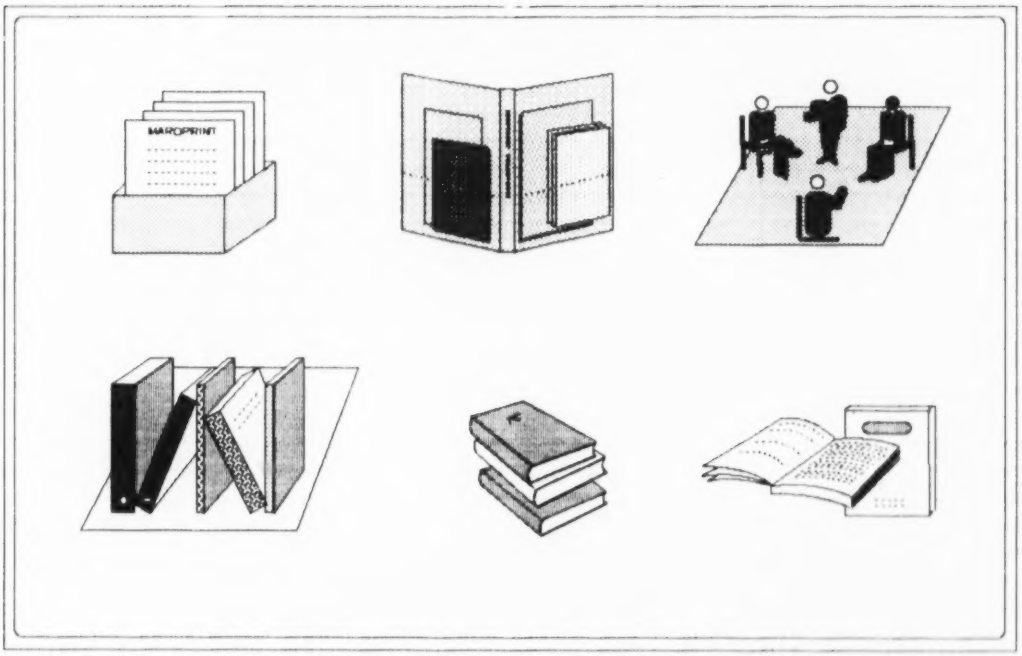
The pages that follow show examples of standard overhead transparencies. Some of them can be used almost as they are for training purposes. Such transparencies should be adapted to the individual trainer's requirements. The examples do not show the full range of features offered by the graphics and drawing programs used in their production - Draw and Designer from Micrografx for the most part - but are indicative of what can be achieved.

Aldus PageMaker was used for the DTP materials and case-study. The graphics were produced with Foxgraph Plus. All these programs operate under Windows.

CATALOGUE OF TRAINING MATERIALS

CATALOGUE DU MATERIEL DE FORMATION

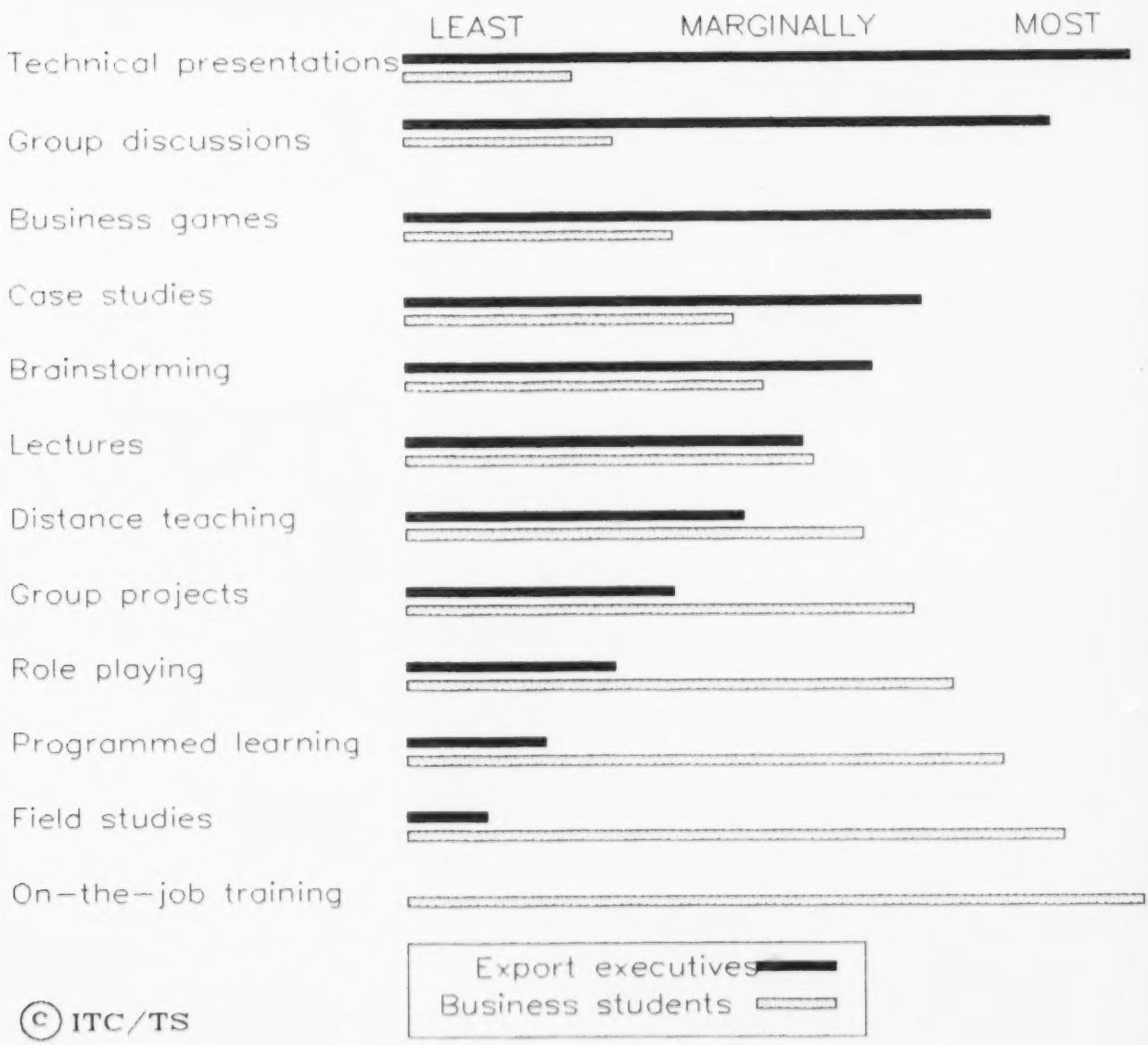
CATALOGO DE MATERIAL DE CAPACITACION

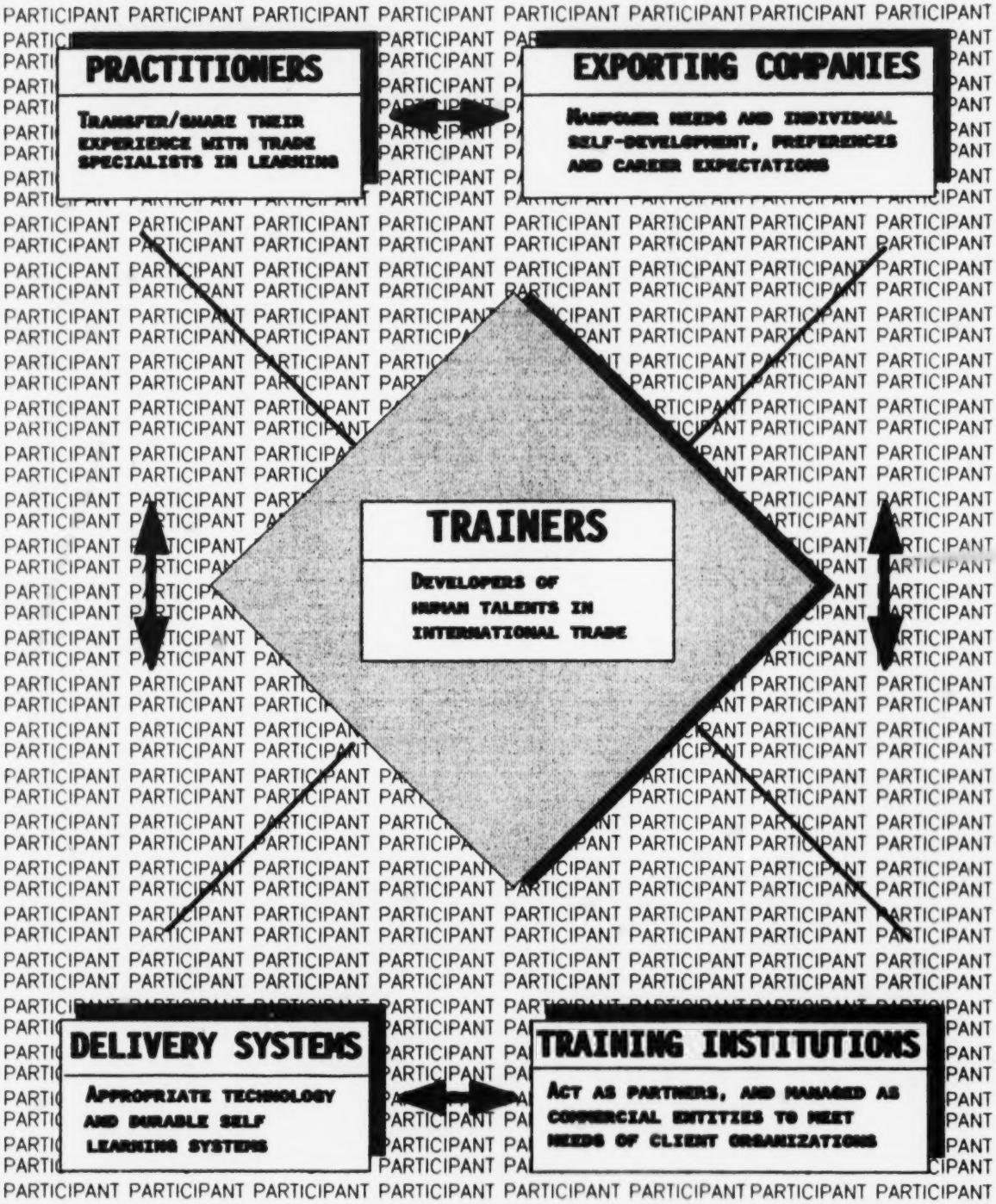


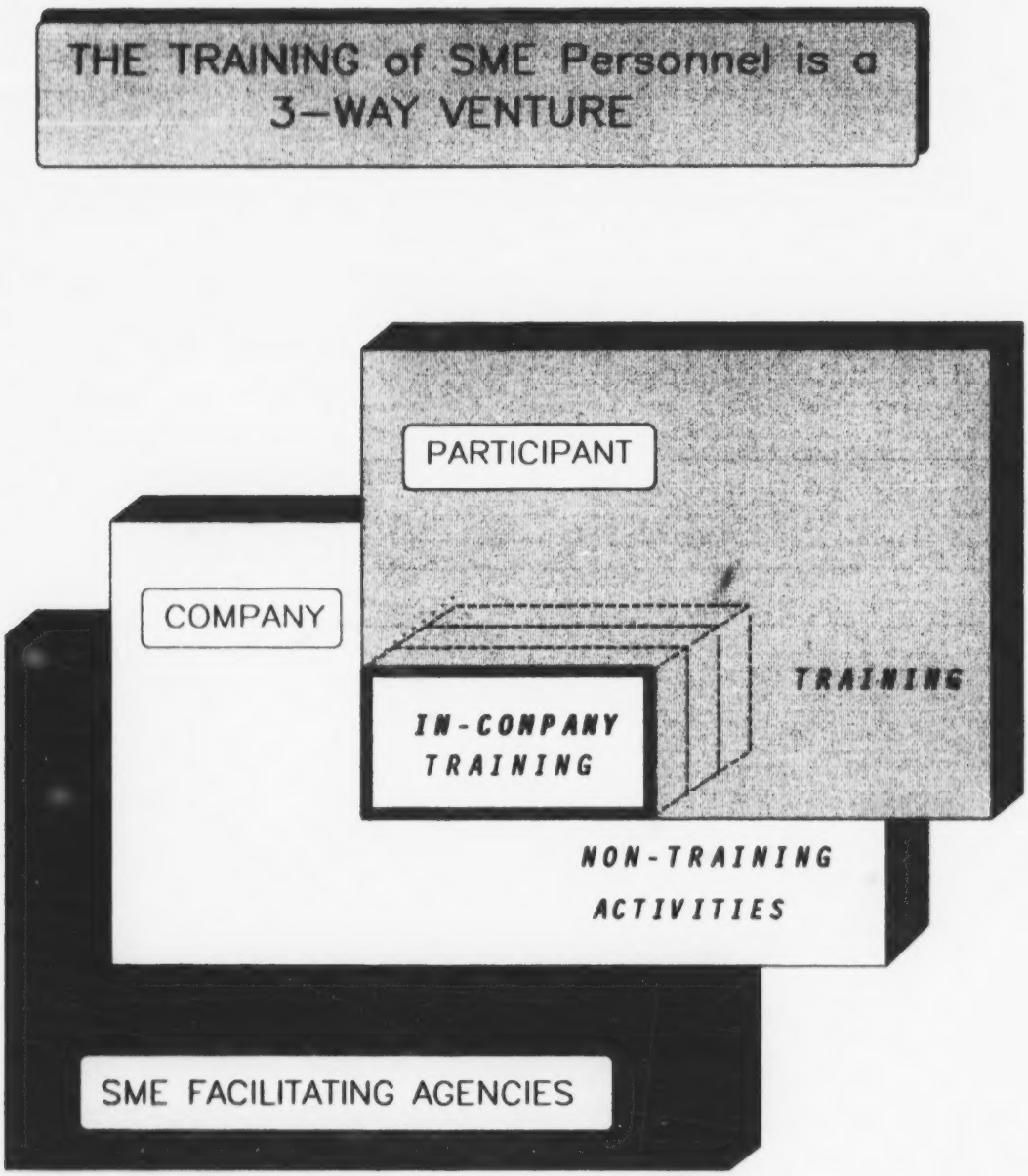
FINANCED BY THE GOVERNMENT OF SWEDEN
FINANCE PAR LE GOUVERNEMENT DE LA SUEDE
FINANCIADO POR EL GOBIERNO DE SUECIA

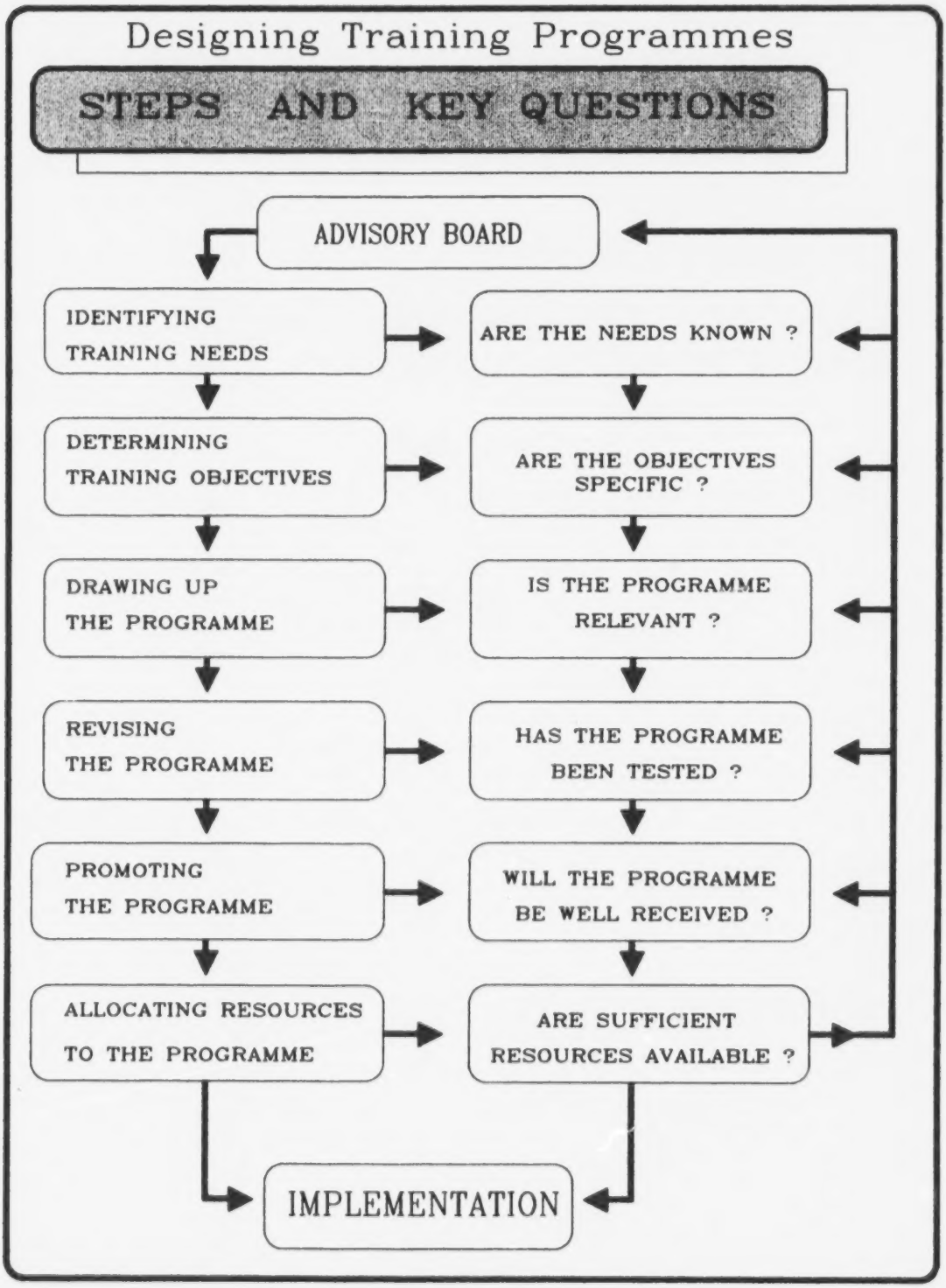
EXPORT TRAINING E4

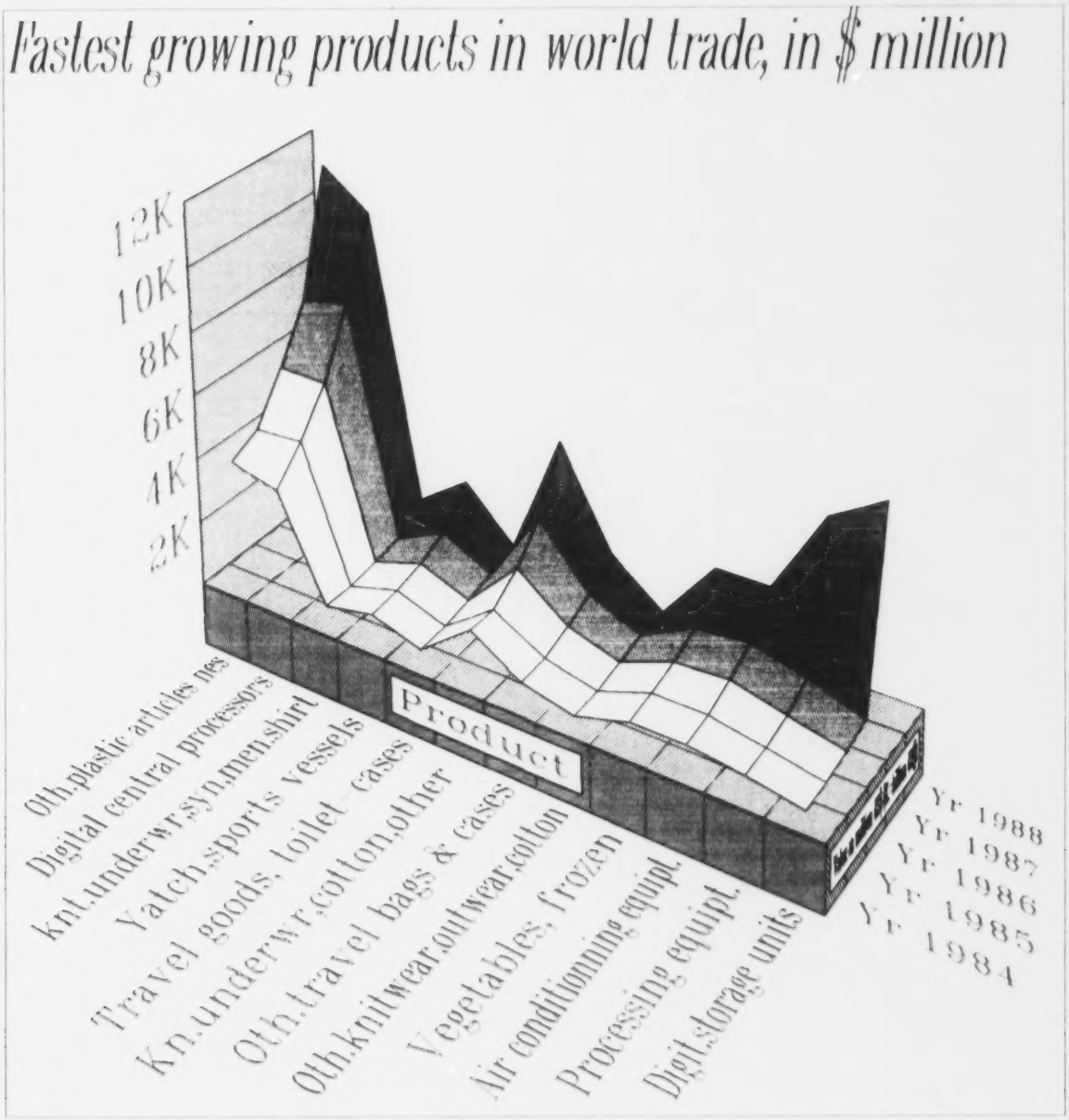
EFFECTIVENESS OF DIFFERENT TEACHING METHODS FOR TWO DIFFERENT TARGET GROUPS – EXPORT EXECUTIVES AND BUSINESS STUDENTS




PRACTITIONERS
TRANSFER/SHARE THEIR EXPERIENCE WITH TRADE SPECIALISTS IN LEARNING
EXPORTING COMPANIES
MANPOWER NEEDS AND INDIVIDUAL SELF-DEVELOPMENT, PREFERENCES AND CAREER EXPECTATIONS
TRAINERS
DEVELOPERS OF HUMAN TALENTS IN INTERNATIONAL TRADE
DELIVERY SYSTEMS
APPROPRIATE TECHNOLOGY AND DURABLE SELF LEARNING SYSTEMS
TRAINING INSTITUTIONS
ACT AS PARTNERS, AND MANAGED AS COMMERCIAL ENTITIES TO MEET NEEDS OF CLIENT ORGANIZATIONS


THE TRAINING of SME Personnel is a 3–WAY VENTURE
PARTICIPANT
COMPANY
IN-COMPANY TRAINING
TRAINING
NON-TRAINING ACTIVITIES
SME FACILITATING AGENCIES


Designing Training Programmes
STEPS AND KEY QUESTIONS
ADVISORY BOARD
IDENTIFYING TRAINING NEEDS
ARE THE NEEDS KNOWN ?
DETERMINING TRAINING OBJECTIVES
ARE THE OBJECTIVES SPECIFIC ?
DRAWING UP THE PROGRAMME
IS THE PROGRAMME RELEVANT ?
REVISING THE PROGRAMME
HAS THE PROGRAMME BEEN TESTED ?
PROMOTING THE PROGRAMME
WILL THE PROGRAMME BE WELL RECEIVED ?
ALLOCATING RESOURCES TO THE PROGRAMME
ARE SUFFICIENT RESOURCES AVAILABLE ?
IMPLEMENTATION

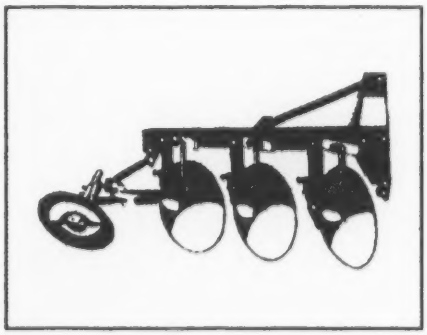

Fastest growing products in world trade, in $ million
12K
10K
8K
6K
4K
2K
Oth.plastic articles nes
Digital central processors
knt.underwr.syn.men.shirt
Yatch.sports vessels
Travel goods, toilet cases
Kn.underwr.cotton.other
Oth.travel bags & cases
Oth.knitwear.outwear.cotton
Vegetables, frozen
Air conditioning equipt.
Processing equipt.
Digit.storage units
Product
Yr 1988
Yr 1987
Yr 1986
Yr 1985
Yr 1984

Example of a case study developed with PAGE MAKER

ANALYSIS ON ENTERING NEIGHBOURING EXPORT MARKETS

A Zimbabwean farm equipment manufacturer is invited to bid for a major tender at a time when it is already producing near full capacity.

SOUTHERN FARM EQUIPMENT COMPANY



SOUTHERN FARM EQUIPMENT COMPANY

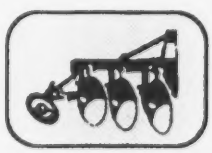
The Case

Following a sales mission to several neighbouring African countries, the Southern Farm Equipment Co. (SFEC) in Zimbabwe received the following telex from the Ugandan Supply Corporation:

> **TO SOUTHERN FARM EQUIPMENT FROM UGANDAN SUPPLY CORP., MINISTRY OF AGRICULTURE. UNDER FARM EXPANSION PROGRAMME, WILL OPEN TENDER FOR 1,000 (ONE THOUSAND) THREE FURROW PLOUGHS. PLSE TELEX OFFER AND CONDITIONS.**

The telex arrived while the SFEC Sales Representative was visiting other countries and would be for another two weeks, and could not therefore be reached easily.

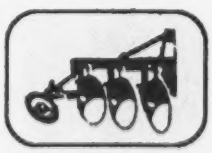
The bid meant a great deal for SFEC as it was embarking on a regional export campaign. The company was pleased with this breakthrough in view of



SOUTHERN FARM EQUIPMENT COMPANY

the renewed priority given by governments to improving productivity in the agricultural sector. Despite the increasing competition from other local manufacturers and well-known international farm equipment producers, SFEC had maintained its position as a leading manufacturer of farm equipment. The major strength of the company was its ability over the years to have developed indigenous farm equipment adapted to the region's soil conditions that and that required inexpensive maintenance.

The dilemma now facing the senior management of SFEC is that the size of the tender represents three months of the company's total production. At the moment, the company is near full production and without spare capacity. Furthermore, the company cannot afford dropping the production of other farm equipment to release production capacity, nor is it willing to delay shipment of ploughs to its regular customers. All the members of the management team are proud of their company's reputation as a reliable supplier and would not consider, under any conditions,



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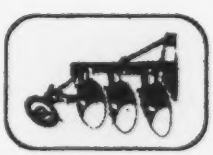
jeopardizing the loyalty of their traditional customers in the domestic market. As a small company with limited financial resources, SFEC's production is based on confirmed orders and no permanent stocks of finished products are kept on hand. Similarly, SFEC keeps a limited stock of raw materials and would need to contact suppliers immediately if it wished to increase production. In addition, the firm makes special efforts to customize its equipment to its clients' special requirements and keeps close contact with both dealers and customers.

As far as plough manufacturing is concerned, the company needs to import wheel bearings (each plough requires one bearing to be inserted in the wheel). It also purchases from a local supplier specialty steel for forged components and it is doubtful whether the supplier would be in a position suddenly to increase output of this steel.

When Mr. A. Collins, the owner and managing director of SFEC met his senior staff to discuss the tender, he said:



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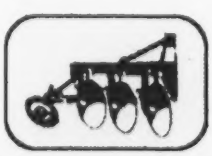
''We cannot expand our production capacity on borrowed funds and hire more staff without sizable confirmed new export orders. You remember very well how one of our local competitors did just that a few years ago and was forced into bankruptcy.''

Mr. A. Collins is proud of his company's achievement in the past decade, having earned a national reputation in Zimbabwe as a reliable manufacturer of farm equipment that uses appropriate technology particularly suited to the region's soil conditions.

Under his management, the firm moved from an importer of tractors and farm implements to a manufacturer of farm equipment. He's also aware that his plant equipment is old, and although well maintained, could not withstand the wear and tear of a second shift. As the equipment was originally imported second-hand from the United Kingdom, any spare parts (if still available) would have to be imported. It is a time-consuming and



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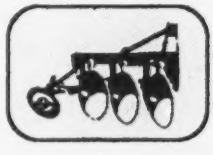
lengthy process to obtain an import licence, obtain the release of foreign exchange, place the order, and arrange for shipment, etc. Those spare parts that are no longer available from suppliers are made by the company itself, a time-consuming process. Another constraint facing the company is the availability of qualified workers. Southern Farm Equipment Co. has had a policy of hiring young workers, training them and providing above-average wages in order to retain them. The hiring and training of new workers must be considered in the light of labour regulations which stipulate that an employee cannot be dismissed after three months of satisfactory employment.

Mr. Collins has called a meeting of his senior staff and asked:

" What should we do with this tender, in view of our production constraints? "



SOUTHERN FARM EQUIPMENT COMPANY

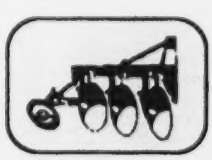
Guidelines for Discussion

1. **Terms of payment**: What will they be ?

2. **Financing**: Is the tender tied to aid funds? If it is bilateral aid, can the firm submit a bid?

3. **Delivery**: What will the transport and logistics arrangements be in terms of time, costs and packing?

4. **Long-term solution**: Should the company consider adopting an export strategy if they wish to have a leading role in the regional market? What risks would management incur in expanding capacity for the export market?



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INTERNATIONAL TRADE CENTRE

UNCTAD/GATT

The International Trade Centre UNCTAD/GATT (ITC) is the focal point in the United Nations system for technical cooperation with developing countries in trade promotion. ITC was created by the General Agreement on Tariffs and Trade (GATT) in 1964 and since 1968 has been operated jointly by GATT and the UN, the latter acting through the United Nations Conference on Trade and Development (UNCTAD). As an executing agency of the United Nations Development Programme (UNDP), ITC is directly responsible for implementing UNDP-financed projects in developing countries related to trade promotion.

ITC works with developing countries to set up effective national trade promotion programmes for expanding their exports and improving their import operations. One aspect of this activity is advising governments on their national trade promotion strategies, institutions and services. ITC also provides market development services aimed at identifying new export opportunities, adapting products for sale abroad and promoting these goods on the international market. Such work is undertaken for both nontraditional exports of developing countries and selected primary commodities. ITC's special services to back up these export marketing efforts include advice on export packaging, quality control, costing and pricing, publicity, trade information, export financing, institutional requirements for trade promotion, legal aspects of foreign trade, joint marketing for small and medium-size firms, and setting up commercial representation abroad. ITC also works with import management organizations to improve their import operations and techniques. Training is organized by ITC on a broad range of export and import subjects. In addition to these core areas, ITC's programme deals with the special trade promotion needs of the least developed countries and trade promotion activities of national chambers of commerce and other business organizations.

ITC technical cooperation projects are carried out in developing countries at the national regional and international levels. They are administered from ITC headquarters in Geneva, but are implemented by ITC experts, who work in close liaison with officials in the countries concerned. Projects may be short-term activities focusing on one specific aspect of trade promotion or longer, integrated programmes covering several trade promotion elements.

In addition to project support, ITC headquarters activities consist of research and development in trade promotion and international marketing. Several market information and statistical services operated from ITC's Geneva office. ITC publications programme from headquarters include market trade, trade promotion handbooks, training material, directories, bibliographies, and a quarterly trade promotion magazine.

Financing for ITC's technical cooperation activities in developing countries comes from UNDP, international financing institutions and individual developed and developing countries. ITC headquarters budget is funded in equal parts by GATT and the UN.

The governing organs of GATT and UNCTAD provide the overall policy guidelines for ITC's operations. ITC's current activities and forthcoming work programme are reviewed at the annual meeting of the Joint Advisory Group, which is attended by member governments of GATT and UNCTAD.

ITC is headed by an Executive Director who oversees the work of approximately 200 staff, in Geneva.

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